

News of the Industry Begins Page 564

AUTOMOTIVE INDUSTRIES

LAND AIR WATER

Volume 68
Number 18

PUBLISHED WEEKLY AT CHESTNUT AND 56TH STREETS
PHILADELPHIA, MAY 6, 1933

\$1.00 a year
25c a copy

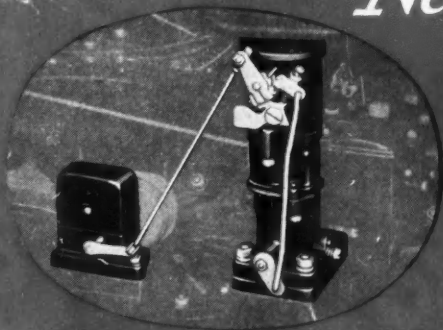
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The answer is yes. But low operating cost has not generally been the object of compression changes. And where practically all of the increased efficiency of higher compression is turned into better performance, there is not such a great increase in economy.

The sole reason for the compression increases that every American car man-

ufacturer has made during the past six years has been **PERFORMANCE**: more power—faster acceleration—better hill-climbing ability—easier cooling. It is easy for the tremendous gains made in these factors to overshadow a slight increase in operating cost.

Therefore it is not difficult to find 1933 cars that show a lower cost per mile for fuel with low compression engines and regular gasoline than they do with high compression and Ethyl Gasoline. No one is surprised at this. Performance cake is worth the price—and more.

But from such cars, some automotive engineers and many sales departments have assumed that high compression is

a luxury that does not justify the added cost of Ethyl Gasoline in dollars and cents. High compression **IS** luxury, and luxury that car owners **WANT**—but to say it is not economically justified is to overlook the fact that better performance is only an alternative for increased mileage that would allow the High Compression-Ethyl Gasoline combination to make savings on the operating cost of old-fashioned motors!

On the opposite page are performance curves and fuel economy curves for one car that demonstrate how optional high compression can give dramatically better performance at the same or even **LOWER** operating cost.

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Hill-climbing curves in the upper diagram show how decidedly this 7 to 1 compression ratio outperformed its 5.7 to 1 brother on the grades. It also accelerated $12\frac{1}{2}\%$ faster and produced 3 miles per hour higher top speed.

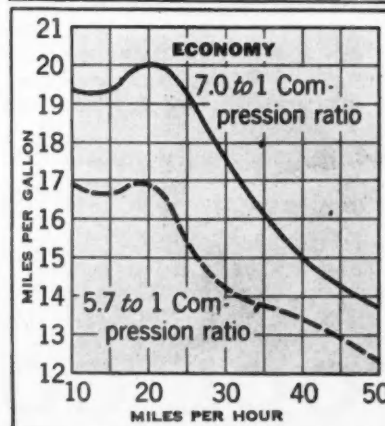
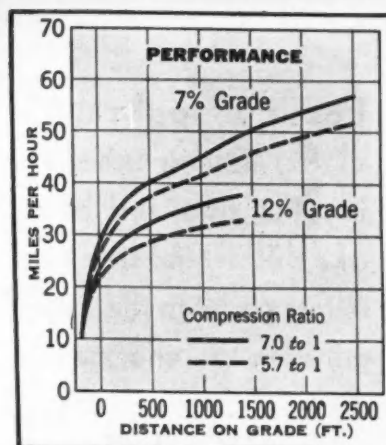
AND fuel economy curves (in the lower diagram) show 20 miles a gallon for Ethyl Gasoline in the high compression engine and only 16.8 miles per gallon for regular gasoline in the low compression engine at twenty miles an hour. A saving of 19%. At twenty-five miles an hour the difference is greater; the saving is over 25%. At thirty miles an hour the difference is the same as at twenty but the percentage is greater

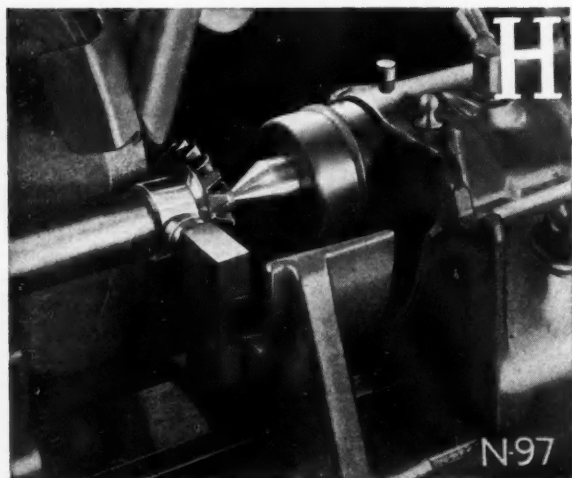
... 23%. At thirty-five miles an hour the saving is 17%. And even at forty miles an hour it is 12%.

Some day soon, some smart car manufacturer is going to make a powerful sales asset out of the requirement of Ethyl Gasoline in just such a car as is represented by these curves. "Here is a car that allows you to use the world's highest quality motor fuel at no extra cost. Here is a car that gives you the advantages of Ethyl Gasoline and costs less per mile than cars that use cheap motor fuels."

It has all the earmarks of a successful sales point. Ethyl Gasoline Corporation, Chrysler Building, New York City.

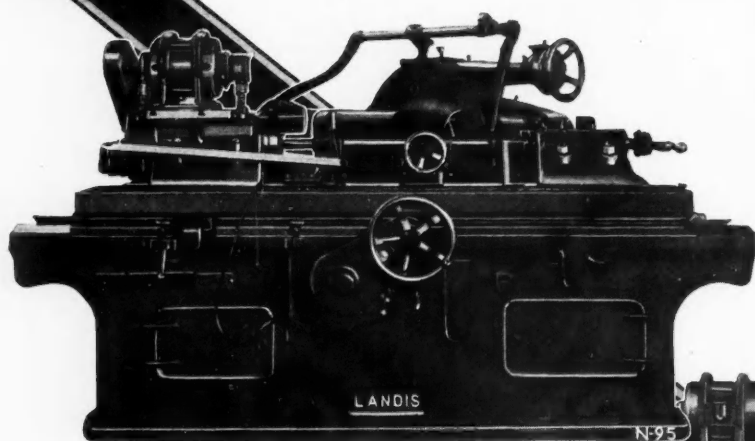
Ethyl fluid contains lead. © E. G. C. 1933



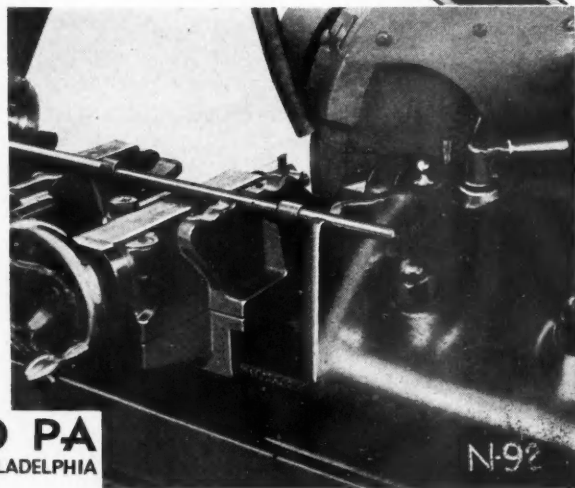
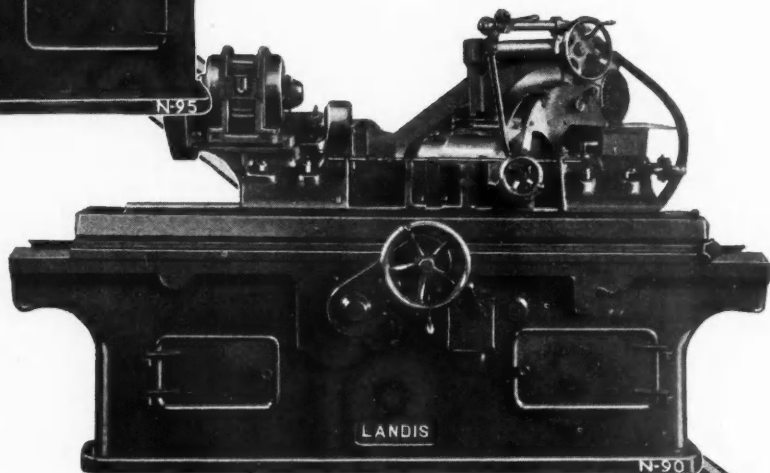


HERE—We set the wheel base at an angle

Several Landis Type B Plain Hydraulic Grinders are here shown with the wheel base set at an angle. This method of grinding is recommended where two adjacent surfaces at right angles to each other are to be finished. ¶ As the views indicate the wheel base may be set to feed in the direction of the footstock or in the direction of the headstock—all depending upon the nature of the work. Above, to the left, is illustrated a typical set-up on one of these machines while below, to the right, the wheel truing device is clearly pictured.



Possible applications include, among others, grinding the hub and back face of a differential side gear that is integral with the axle shaft; grinding the end main bearing and side of the flange of a camshaft and grinding the face and outside diameter of a pinion bearing cage. ¶ You may be manufacturing a like part in sufficient quantities to easily justify the purchase of similar equipment.



LANDIS (98)
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May 6, 1933

Automotive Industries

AUTOMOTIVE INDUSTRIES

AUTOMOBILE

Volume 68

Reg. U. S. Pat. Off.

Number 18

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Automotive Industries is published every Saturday by

CHILTON COMPANY

Chestnut and 56th Streets, Philadelphia, Pa.

C. A. MUSSELMAN, President and General Manager
 J. S. HILDRETH, Vice-Pres. and Director of Sales
 W. I. RALPH, Vice-Pres. G. C. BUZBY, Vice-Pres.
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 Los Angeles—Room 651, 1206 Maple St., Phone Westmore 6477
 Portland Oregon—72 Fifth St.

Controlled by United Publishers Corporation, 239 W. 39th St., New York; FRITZ J. FRANK, President; C. A. MUSSELMAN, Vice-President; F. C. STEVENS, Treasurer.

SUBSCRIPTION RATES: United States, United States Possessions, and all countries in the Postal Union, \$1.00 per year; Canada and Foreign, \$4.00 per year. Single Copies, 25c.

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Automotive Industries—The Automobile is a consolidation of the Automobile (monthly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

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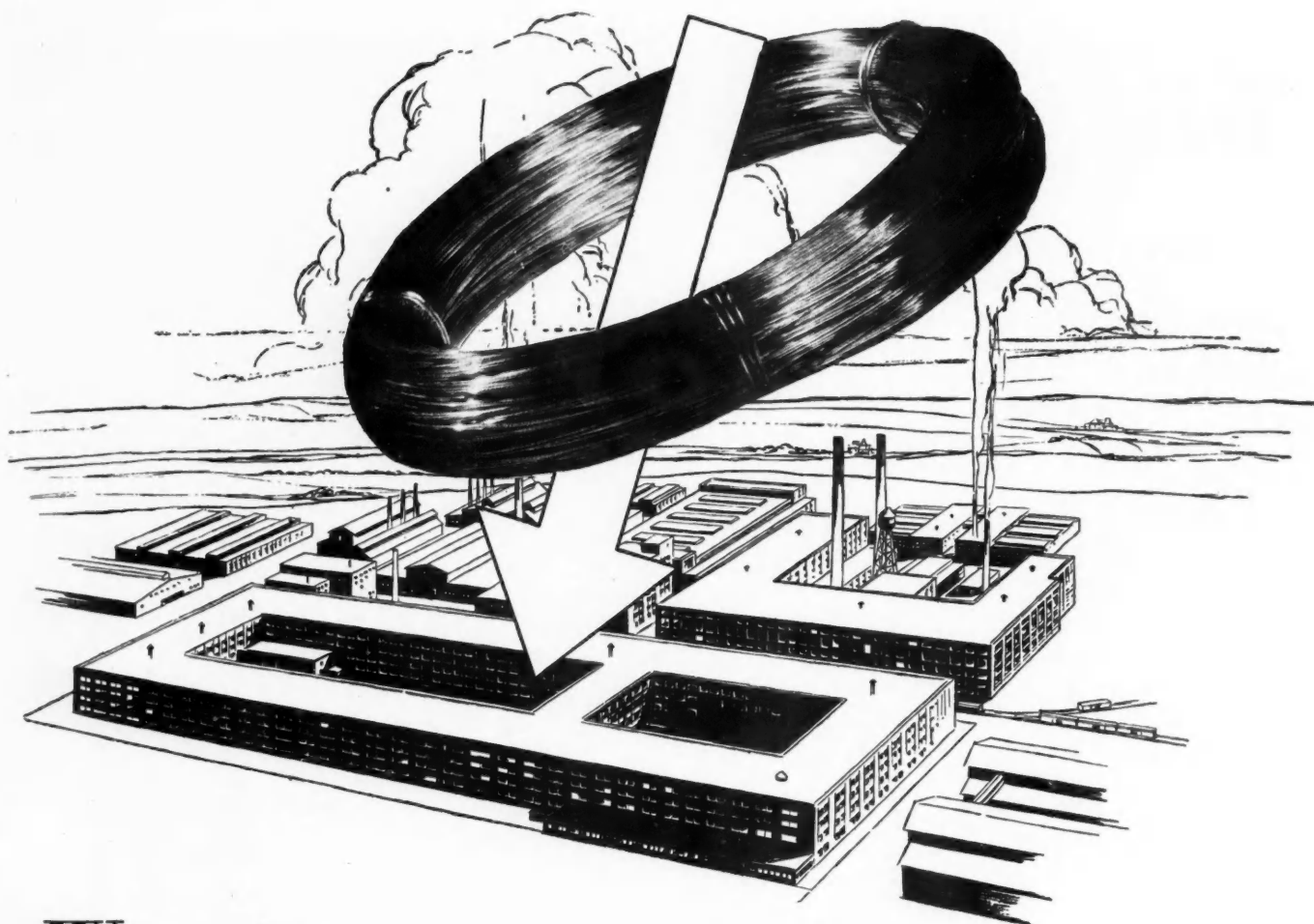


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May 6, 1933

Automotive Industries

Industry Forging Ahead Despite Political Uncertainties

May Production Off to Good Start—
April Output Places Year-to-Date
Total Ahead of 1932

WITH unprecedented powers over many phases of the country's economic life placed in the administration's hands, probably never before has business been confronted with so many uncertainties. Yet despite the fact that it is impossible to gage the effects of the emergency legislation until it becomes clear what use is to be made of the sweeping authority granted, business activity already has recovered to pre-bank-holiday levels and further expansion appears to be in prospect with steel and automobiles among the leaders.

May motor vehicle production is starting off strongly and is practically certain to exceed April by a substantial margin, and very likely

to be above May, 1932, when production totaled 192,000 cars and trucks. Of course, under existing conditions, prediction is fraught with unusual hazard not only because of the uncertainty regarding the effects of the new rules which Washington is writing for the economic game, but also because vehicle manufacturers are watching

retail sales as a cat watches a mouse. Consequently any change in the retail picture, up or down, will be reflected rather quickly in production schedules.

Although only unofficial data for April are available as this is written, *Automotive Industries* estimates that output in that month was about 165,000 as compared with 155,000 in the same month last year. This estimate would make April the best month since June, 1932. The total for the first four months is 533,000 as compared with 528,000 in the same period last year, a gain of one per cent.

Complete figures are now available for the first quarter, and Table I shows how they compare with 1932. Passenger car production actually was greater during the first three months of 1933 than in 1932, but a slump in truck output more than offset this gain, resulting in a decline of about one per cent in total output for the quarter.

Wholesale price class data in

by Don Blanchard
Editor, *Automotive Industries*

Table I
Production—United States and Canada

	First Quarter		Per Cent Change from 1932
	1933	1932	
Cars	312,236	306,522	+2
Trucks	56,513	66,725	-15
Cars and Trucks....	368,749	373,247	-1

**Table II—Passenger Car Production
by Wholesale Price Classes**

First Quarter—1933 and 1932

	Cars		Per Cent Change from 1932	Per Cent of Total	
	1933	1932		1933	1932
Under \$500	242,257	138,526	+75	77.6	45.2
\$50-\$1,000	57,836	138,873	-58	18.5	45.3
\$1,001-\$1,500	6,554	19,387	-66	2.1	6.3
\$1,501-\$2,000	2,897	4,307	-32	0.9	1.4
\$2,001 and up	2,692	5,429	-50	0.9	1.8
Total	312,236	306,522	+2	100.0	100.0

Truck Production by Capacities

First Quarter—1933 and 1932

	Trucks		Per Cent Change from 1932	Per Cent of Total	
	1933	1932		1933	1932
1½ tons and under	53,232	62,008	-14	94.2	93.0
2-3 tons	2,614	3,134	-17	4.6	4.7
3½ tons and over	435	1,374	-68	0.8	2.0
Ambulances, fire, buses, etc.	220	209	+5	0.4	0.3
Total	56,501	66,725	-15	100.0	100.0

Table II indicates that despite the industry's relatively favorable showing on a unit basis, its dollar volume was down substantially in the first quarter. This is in part due to lower prices and in part to the continued swing to the low-priced field which probably has

been stronger this year than ever before. Truck production classified by capacities does not show any material change in proportion from last year except in the "3½ tons and over" group which declined sharply.

Domestic registrations of new

passenger cars amounted to 227,000 in the first quarter against 262,000 last year, a decline of 13 per cent. Of these registrations, Ford, Chevrolet and Plymouth obtained 67 per cent as compared with 53 per cent in 1932. Adding Dodge and Pontiac to these three leaders in the low-priced field, the first quarter total for these five lines represents 77.7 per cent of all retail sales against 62.2 per cent a year ago. The entire low-priced group which, in addition to these five makes, includes Continental, DeSoto, Essex, Rockne and Willys, accounted for 84.4 per cent of domestic retail business whereas the same cars in the first quarter of 1932 obtained only 71.6 per cent on unit volume.

Naturally this big swing to the low-priced market had its effects on the medium and high-priced groups. The former, which includes Auburn, Buick, Chrysler, Graham, Hudson, Hupp, Nash, Olds, Reo and Studebaker, obtained only 13.5 per cent of first quarter unit volume against 25.0 per cent a year ago. The high-priced cars also sustained a shrinkage from 3.4 per cent of total in 1932 to 2.1 per cent in the first three months of this year.

Although Canadian production was off about 25 per cent in the first quarter from last year, exports from the United States increased from 22,762 cars and trucks in the first three months of 1932 to 29,056 this year, a gain of 28 per cent. The chances appear good, the industry feels, for overseas business to continue to show in this favorable light, particularly in view of the depreciation in dollar exchange which, of course, is equivalent to a proportionate reduction in prices in foreign markets.

Table III—U. S. Registrations of New Passenger Cars

First Quarter

	1933	1932	Per Cent Change from 1932	Per Cent of Total
Low Price—Chevrolet, Continental, DeSoto, Dodge, Essex, Ford, Plymouth, Pontiac, Rockne, Willys	189,899	185,254	+2	84.4
Medium Price—Auburn, Buick, Chrysler, Graham, Hudson, Hupp, Nash, Olds, Reo, Studebaker	30,402	64,611	-53	13.5
High-Price—Cadillac, Franklin, Lincoln, LaSalle, Packard, Pierce	4,628	8,863	-48	2.1
Miscellaneous	1,526	2,809	....	....

JUST AMONG OURSELVES

Industry Is Game

THE automotive industry as a whole is definitely sympathetic to the idea of cutting Federal expenditures and balancing the budget. To achieve this necessary end, most executives are willing to see curtailment even in services from which they themselves benefit, without battling very hard for their continuance. They take the attitude that the big job can't be done if every special interest insists on favored treatment for its own governmental helps.

We find the industry in general and the exporters in particular eager to see the work of the automotive division of the Foreign and Domestic Commerce continued as vigorously as possible, however, because of the effective service which that commodity division continues to render in a practical and active manner. There is some feeling also that serious reductions in the Foreign and Domestic Commerce Bureau as a whole might be uneconomical rather than helpful to industry.

But the industry is behind the President's curtailment plans in general, that's sure. Besides, as one executive said, "The cuts are going to be made, so there's no use arguing about it." More than one has expressed a sincere hope, however, that if the bureau's budget must be cut to complete necessary total budget savings, pruning shears rather than an ax be considered as a suitable tool for the job, and it now appears that the administration will take this attitude.

Export Expansion

AUTOMOTIVE exporters are feeling more cheerful today than for some time past. Their optimism is based on underlying economic movements which they see as favorable to overseas trade rather than on any important sales increases yet capable of statistical recording. They do point out, however, that throughout the depression export sales for most companies have continued to be in as good a percentage relationship to total sales as in boom times and that export proportions have definitely increased in a number of instances.

Important among the favorable signs can be recorded President Roosevelt's announced "friendly neighbor" policy in foreign relationships which has already begun to take shape definitely enough to bring a decrease in anti-American feeling in some foreign areas. Then, too, tariff reductions have begun to take place here and there. Australia, an important automotive export market, for example, has removed its 50 per cent customs surtax.

It would seem as though a sound basis were being laid for constructive development of foreign sales when the economic condition of the world readjusts itself.

First Fruits

THE motor industry's policy of fighting its legislative battles with facts gradually seems to be taking effect. Its interests have fared better in the 1933 than in the 1931 state legislatures. At

least there have been less additional unfavorable bills passed on regulatory and rate-fixing subjects.

About 5000 bills affecting truck operation were introduced into the state legislatures this year as against about 7000 in 1931. And, the Highway Users Conference tells us, provisions for more drastic regulation and the fixing of rates for contract and common carriers by motor truck have been defeated in a majority of state legislatures in which they were offered this year.

The defensive strength of motor truck interests has increased materially in the last year or two. Eventually, we believe, a strong offensive may have to be developed. In any case, the basic position of the whole automotive case was strengthened greatly by the unbiased findings of the National Transportation Committee.

One of the best signs in the current legislative news is the reduction of motor vehicle registration fees in at least four or five states.

Business As a Risk

HERE is a news item which was so interesting to us that we just can't refrain from reprinting it here, even though we can't figure out any "automotive angle" to make its publication justifiable in these columns:

Survey by American Council of Foreign Bondholders shows that of \$1,490,689,000 in defaulted foreign bond issues 44 per cent were obligations of foreign governments; 18.5 per cent of provincial governments; 13.5 per cent of municipal governments; 8 per cent borrowings by banks and only 16 per cent were bonds of corporate organizations. —N. G. S.

Parts Makers' Role Gets Bigger as Automotive History Unfolds

While "Assembled Car" is an almost forgotten term, parts specialists today are more important contributors to automotive progress than ever before

UP to ten years or so ago we used to distinguish between car manufacturers and car assemblers. Today it would be quite impossible to make a clean-cut division of passenger-car producers into these categories. Practically every car maker turns out his own engine, and if it is made for him outside, it is not a stock engine but is built more or less to his own designs. On the other hand, we have now a number of large corporations which control not only car factories but also parts factories.

From this it might appear that the parts industry must have lost much of its one-time importance. And yet, if the situation is closely analyzed, it is found that the automobile parts and accessories industry, far from being in a state of decay, is a very virile branch of the automobile industry. There is probably no car manufacturer who does not get a considerably greater part of his components and items of equipment from outside plants today than did the so-called manufacturers (as distinguished from assemblers) of a decade ago. And the role which the parts and accessory manufacturers are playing in the technical advancement of the industry seems to be gaining from year to year.

If we make exception of such items as tires, carburetors and electrical equipment, the parts industry in Europe has had a comparatively slow growth and today has not attained anything like the importance of the corresponding industry in this country. This is due to the fact that European car makers never could see the logic of "paying a profit to the other fellow" on parts which they could make themselves. That it is good policy to do so is, however, recognized

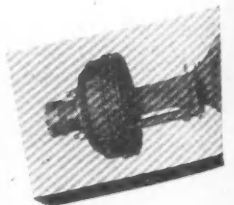
by American car makers, and if they do not go out of their way to broadcast this conviction to the world, they attest it by their acts.

It is good policy for the car manufacturer to give the manufacturer of parts or accessories a chance to earn a profit if the latter can turn out the products either cheaper, or better, or both. That the parts maker in many cases can turn out products of equal merit cheaper than the car maker or superior products at no increase in cost does not reflect a higher degree of engineering and industrial talent, but rather the advantages of specialization. An automobile chassis is a very complicated mechanism, and any single engineering staff that has to develop a new car model complete in the time usually allotted to the task naturally must limit the study it can give to any particular part, and it is practically impossible for it to develop the possibilities of any given part with the same thoroughness as a staff specializing on this part. This applies not only to design and choice of materials but also to a certain extent to manufacturing methods.

There is no doubt that the high standing of the American passenger car in the world's markets is to a considerable degree the result of the efforts of our specialists who confine themselves to the development and production of one or a few (usually closely related) parts or accessories which they furnish to the car manufacturers generally. A review of the contribu-

tions of the parts and accessories industry to the technical development of the automobile should therefore prove of interest. In making this review we may disregard those particular lines, such as tires and electrical equipment, which have practically always been made outside the automobile factories.

Probably no better illustration of the part taken by the parts industry in automobile development in recent years could be cited than that of brakes (except assemblers who bought their axles). Previous to the advent of four-wheel brakes, about 1920, every car manufacturer produced his own brakes. Today more than 80 per cent of the car models on the market carry brakes made by specialists. The introduction of front-wheel brakes involved new problems of design which were attacked energetically by parts makers. These parts makers also introduced new methods of production, such as making the brake shoes of steel pressings instead of castings, which tended to reduce their cost and weight and increase



their strength and stiffness. That only four different makes of brakes are in use on more than 80 per cent of all the passenger car chassis now on the market also tends toward more efficient service than if each make of car had its own design of brake and its own method of brake adjustment.

The great braking power of modern cars is in large part due to the improvements which have been made in brake lining materials, all or practically all of which are to the credit of the specialized industry producing such materials. Power units for the operation of vehicle brakes, which are now coming into use on passenger cars, are a development due to the efforts of brake specialists.

Many details of the gasoline engine have been greatly improved by parts makers and specialists. Crankshafts are made for the most part by drop-forging concerns who successfully solved many problems that arose in connection with multi-throw crankshaft production, such as the accurate indexing and cen-

tering of multiple-throw crankshafts, the forging of six-cylinder crankshafts with curved long crank arms, and forging crankshafts with integral balance weights.

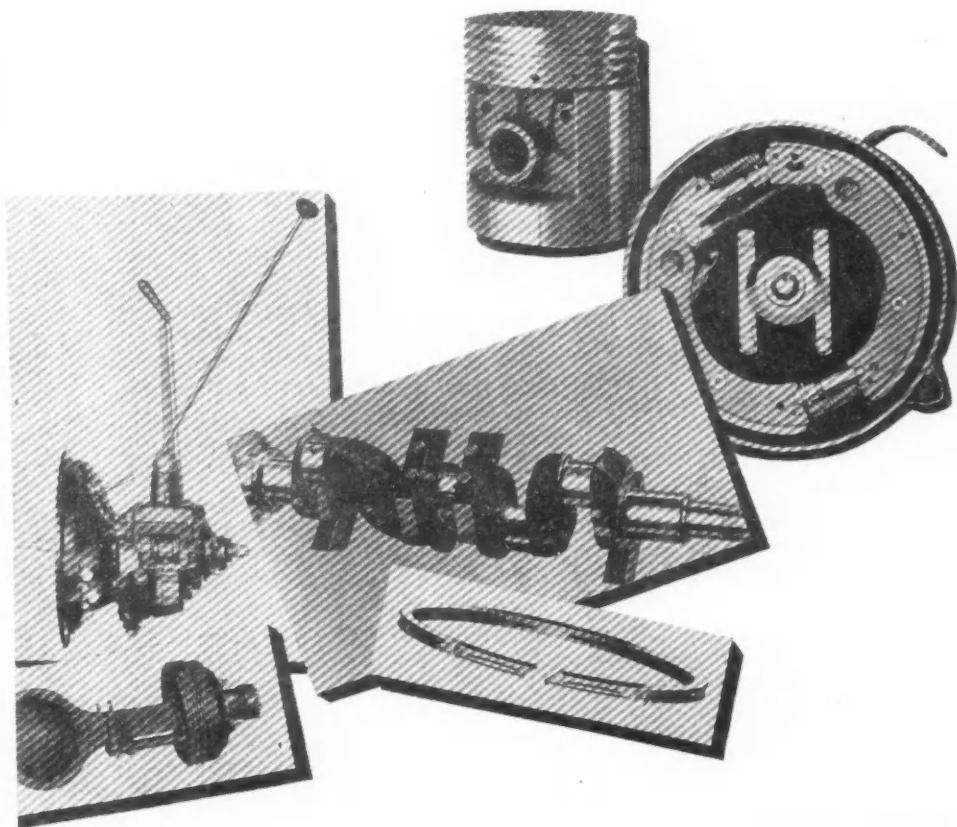
Piston development has been largely in the hands of specialists for a great many years. They introduced the aluminum-alloy piston and they overcame its early deficiencies by the development of the invar-strut type, of the Lo-Ex alloy, and the split-skirt and cam-ground types. Piston-ring design also owes much to specialists. When special designs of rings were first introduced on the market they were used only for replacement, and it took quite a number of years until engine builders could be convinced that they could do better by buying

their piston rings from outside concerns than by making them themselves. Piston-ring manufacturers have greatly improved the technique of the manufacture of these products, so that now they wear in rapidly in the cylinder bore and exert a nearly uniform pressure on the cylinder wall all around. Moreover, they have developed the oil control ring, without which the oil consumption of engines at the high speeds now commonly used would be excessive.

That exhaust valves are able to stand up under the high speeds now common is due to the use of special alloy steels such as high-tungsten and silicon-chromium, which were introduced by valve specialists. These same specialists also deserve credit for the development of the salt-cooled valve and the copper-cooled valve, which, although not yet required in passenger-car engines, are found very serviceable in heavy-duty commercial vehicle and aircraft engines. Just where the idea of using valve-seat inserts of hard, heat-resistant materials in cast-iron blocks or cylinder heads originated is somewhat uncertain, but the valve specialists, who are familiar with the treatment required by these materials, are taking a very active part in the development of the inserts.

The high speeds of modern passenger-car engines have raised new problems in connection with all of their working parts, in that the inertia loads on the parts are increased, and it is impossible to increase the size of the parts in proportion, as that would only add further to the loads. This applies to the valve springs, which in high speed engines are subject to surge and consequent breakage. Much important research work on spring surge and on means of minimizing its effects has been carried out by spring manufacturers, who have also constantly striven to improve the materials used in valve springs.

Carburetors for a great many years have been the product of a specialized industry, and at present all but one manufacturer of passenger cars use proprietary car-



by P. M. Heldt

Engineering Editor, Automotive Industries

buretors. It is therefore only natural that practically all of the carburetor improvements made in recent years, such as the economizer feature, acceleration wells and acceleration pumps, were originated in that industry. The writer is not prepared to say where the suggestion for downdraft carburetors came from, but probably it was the response of the carburetor maker to the demand of the engine designer for a carburetor throat size that would give increased power and still permit of satisfactory idling. Carburetor makers also have contributed such recent advances as automatic chokes and automatic heat control in a certain form.

Fuel Systems Supplied by Parts Makers

Since gravity feed was abandoned for the fuel systems of passenger cars, the fuel feed equipment has been supplied by specialty manufacturers, which first developed the vacuum feed system and more recently various types of fuel pumps. Fuel strainers also are supplied to the car makers by specialty manufacturers.

The engine lubrication system has not afforded very much scope for the accessories manufacturer, for it is practically self-contained within the engine and calls for few separate units of equipment. Equipment manufacturers, however, have developed oil purifiers and a device whereby the pump always draws in oil from near the surface of the supply in the sump, instead of from the deepest point of the sump where the sludge accumulates. Mention should be made in this connection also of the various types of tubular fitting that have been developed for oil lines, etc., which must be able to withstand severe vibration without developing leaks and without breaking.

Radiators, because of the specialized processes and equipment required in their production, have for long been the basis of a separate industry which has had its ingenuity taxed by the problem of providing sufficient cooling capacity for engines of an average of 100 hp. with less available frontal area than that used for cooling an engine of perhaps 30 hp. five years ago.

What is perhaps more surprising is that radiator fans should have become a specialized article of manufacture. The probable explanation

is that such accessories as the pump and the fan, because of their simplicity and the relatively small power required by them as used in connection with the early engines, were designed without due regard to efficiency and reliability. Those whose motoring experience goes back a good many years will remember the endless trouble with constantly slipping flat fan belts and with cup-and-cone type ball bearings in the fan which suffered from soft spots on the races. Later on, with an increase in engine power, the power absorbed by the radiator fan became more important; incidentally, fans had to be speeded up to provide the cooling capacity required, and this led to fan noise. These new problems, together with the shortcomings of the earlier fan types with unreliable bearings and an unreliable drive, gave the fan specialist his chance. The mastery of a subject which usually comes as a result of long-continued specialization in it, is, of course, a great help in solving particularly difficult problems. These have not been wanting in the cooling field in recent years, with powers constantly increasing, fashion calling for narrower radiators, and cost considerations imposing additional restrictions.

More than 75 per cent of all passenger-car models now on the market carry proprietary clutches—a greater percentage than at any previous period in the history of the industry. This is pretty conclusive evidence that the clutch manufacturers contributed improvements in design or in manufacturing methods which the car manufacturers could not fail to recognize. Perhaps their chief contribution was that of making the single-plate type of clutch smooth-acting, which type is generally admitted to be the most desirable from the standpoint of easy gear shifting. It is probable, moreover, that pilot bearings, shifting-collar bearings and other details also were improved through their efforts.

Transmission Improvement a Credit to Specialists

Transmission manufacturers have not been able to secure as large a share of the passenger-car market as the clutch manufacturers, but they must be given credit for a large share in the remarkable improvement in passenger-car transmissions in recent years. These improvements include such items as

the use of internal and helical gears for silence in operation, free-wheeling units and synchronizing devices to facilitate gear-shifting, and the use of cyanided, medium-carbon-steel gears to combine a strong core with a hard wearing surface.

For a great many years the automobile industry has obtained its universal joints from specialists. The first development which led to the establishment of a specialized universal joint industry was that of a grease-retaining housing which solved the problem of effective lubrication of these members. The next step was the development of the fabric type of universal, which was permanently silent in operation and required no lubrication; and when this proved unsuitable for really high-speed work, on account of the difficulty of maintaining alignment, the problem of oil lubrication of the joint was attacked and satisfactorily solved. The advent of front-wheel drive some years ago led to the development of a type of universal that transmits motion uniformly regardless of the angularity of its members, and the latest advance in this field is the introduction of needle bearings, to take care of the greater bearing loads due to the increased powers transmitted.

Gear Industry Contributed Silent Rear Axles

Parts makers also have contributed their share to the improvement of rear axles. It was a parts maker who produced the first driving axle with pressed steel housing in this country, while credit for the spiral bevel gear and the hypoid gear, which make rear axles silent in operation, must be accorded to the gear industry, which developed the machinery for cutting the teeth on these gears.

Steering gears today are the product of specialty manufacturers even in the case of cars of the largest production, which again indicates that these manufacturers have carried the development of design and production to a point not previously reached. The gears must be easy to operate, yet must not develop backlash too rapidly, and the control assembly which accompanies them must be simple, neat, and inexpensive, the latter particularly in the case of the cheaper cars.

Other fields in which specialized
(Turn to page 554, please)

German Views on ALCOHOLIC GASOLINES

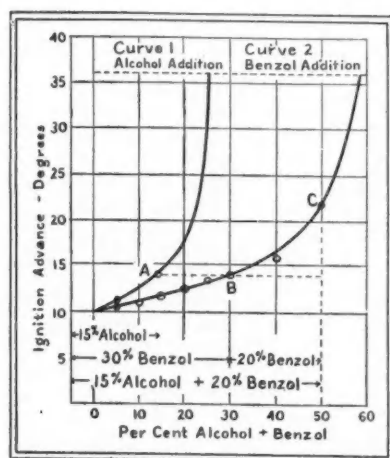


Fig. 1—Effect of alcohol on the anti-detonating quality of a gasoline (four-cylinder engine, 55 hp., 5.36 compression ratio)

SOME of the characteristics of alcohol affecting its value as a component of motor fuels were brought out in a paper contributed by C. O. Ostwald to a symposium on "Fuel Questions" before the Berlin Automobile Club some time ago. Mr. Ostwald points out that in Germany and most of the other countries in which alcohol is used as motor fuel in considerable quantity, practically water-free or anhydrous alcohol is used (at least 99.6 per cent by weight).

Dehydration of the alcohol was and is no simple problem, but may be regarded as having been solved both technically and industrially. Production of alcohol in the absolute state was an essential preliminary to its general use, since the solubility of alcohol in liquid hydrocarbons is preponderantly affected by the water content. Absolute alcohol is soluble in all hydrocarbons used as motor fuel in any desired proportion. The amount of water that may be present in a gasoline-

alcohol solution without separating out is the greater the proportion of alcohol in the solution and the greater the proportion of aromatic hydrocarbons in the hydrocarbon content.

The amount of water which gasoline-alcohol mixtures will hold in solution at 60 deg. F. varies with the proportion of alcohol in the mixture from 0.63 per cent for 20-per cent alcohol to 8.40 per cent for 80-per cent alcohol. For a mixture of 80-per cent gasoline and 20-per cent alcohol the "water value" differs with the grade of gasoline, being 0.63 per cent for straight-run gasoline, 0.72 for "cracked" gasoline, and from 0.77 to 0.92 for four commercial brands of gasoline. Temperature also has an influence on the "water value" of such fuel mixtures. For an 80-20 mixture this value varies from 0.18 per cent at minus 40 deg. F. to 0.93 per cent at 104 deg. F. Experience has shown that the solubility of gasoline-alcohol mixtures is not fully utilized even if the alcohol content drops as low as 10 per cent or less.

One of the most valuable features of alcohol as a motor fuel is its anti-knock characteristic. It has been shown that ethyl alcohol has substantially twice the anti-knock value of benzol (see Fig. 1).

Another interesting characteristic of alcohol is its relatively high latent heat of vaporization, of approximately 400 B.t.u. per pound. When alcohol is used in a moderate proportion in a compounded fuel, this high latent heat is of value in that by cooling the charge during the induction period, it makes for increased volumetric efficiency and therefore for higher output. An-

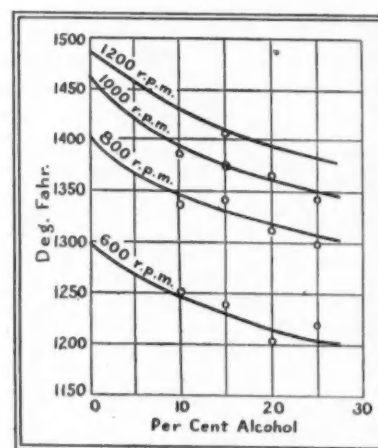


Fig. 2—Reduction in exhaust temperature due to the addition of alcohol to the fuel, at different operating speeds

other effect of the high latent heat of vaporization is said to be a lowering of the exhaust temperature.

Fig. 2 shows for a certain grade of gasoline the effect of the alcohol proportion on the exhaust temperature. This explains why so-called "racing fuels" usually consist principally of ethyl and other alcohols and in some cases are almost pure alcohol.

The technical regulations concerning the application of the German law on the use of alcohol as motor fuel limit the alcohol content to between 20 and 30 per cent and permit of other percentages only in special cases subject to investigation regarding their practicability. This is independent of the clause which compels motor fuel producers to take a certain quota of alcohol, which at present amounts to 6 per cent. This regulation is said to have had the effect of bringing about the general use of alcohol motor fuels without friction and without serious incidents.

1932 Statements Show Need for Moderate

The accompanying tabulations supplement the article in last week's *Automotive Industries* under the above heading. The detail is given here for the 10 companies consolidated in the previous article and also for Graham.

Comparing the 1932 totals for these 11 companies, with 1929, the following changes are disclosed:

Decrease in dollar volume.....	74%	Decrease in book value of plant and property after depreciation	25%
Decrease in unit volume	67	Decrease in capital and surplus less intangibles..	39
Decrease in dividends paid.....	82	Per cent earned on capital and surplus less intangibles, 1929	18
Decrease in cash and securities	20	Per cent lost on capital and surplus less intangibles, 1932	13
Decrease in inventories	60		
Decrease in working capital	42		

	U. S. Registrations of New Vehicles				Sales Volume				Depreciation			
	1929	1930	1931	1932	1929	1930	1931	1932	1929	1930	1931	1932
Auburn	19,300	13,370	31,130	11,980	\$37,551	\$24,114	\$37,086	\$12,845	\$426	\$529	\$567	\$625
Chrysler	388,900	245,290	243,530	199,850	375,033	207,789	183,805	136,547	15,293	15,293	14,297	13,239
Graham	62,600	30,650	19,320	12,855	64,490	27,777	16,499	10,491	932	762	763	726
Hudson	262,900	95,390	62,100	37,420	201,018	78,095	38,236	25,862	3,882	3,975	3,444	3,037
Hupp	45,900	24,720	17,530	10,790	52,506	23,445	.....	8,751	1,026	1,159	1,325	802
Mack	6,800	4,900	3,000	1,425	57,227	43,644	27,621	13,218	2,030	1,827	3,548	617
Nash	108,800	51,950	39,600	20,230	.....	.....	35,928	15,331	.....	.....	1,225	959
Packard	46,200	28,800	16,350	11,055	†107,542	57,690	29,987	15,516	3,123	3,003	2,454	2,077
Reo	30,900	18,040	12,000	7,060	48,011	29,671	17,044	9,096	1,642	2,225	1,299	1,119
Studebaker	96,600	66,000	54,860	47,175	145,304	86,084	64,407	46,234	1,993	2,329	2,252	1,723
White	6,100	4,400	2,600	2,140	48,653	36,533	23,517	17,117	.....	.....	.....	807
Total	1,075,000	583,510	502,020	361,980	\$1,084,829	\$591,397	\$438,202	\$286,926	\$30,347	\$31,102	\$29,949	\$23,965

†Year ended Aug. 31, 1929.

Totals do not include Hupp and Mack. Totals do not include Nash and White.

	Net Income After Interest, Taxes and Depreciation				Common and Preferred Dividends				Balance to Surplus after Dividends, Charges, etc.			
	1929	1930	1931	1932	1929	1930	1931	1932	1929	1930	1931	1932
Auburn	\$3,603	\$1,018	\$3,580	<i>d\$975</i>	\$645	\$764	\$824	\$835	\$2,958	\$254	\$2,756	<i>d\$1,810</i>
Chrysler	21,902	234	1,469	<i>d11,254</i>	13,336	11,065	4,412	4,390	8,566	<i>d10,831</i>	<i>d2,943</i>	<i>d15,644</i>
Graham	<i>d1,464</i>	<i>d4,969</i>	<i>d4,736</i>	<i>d2,811</i>	372	362	329	30	<i>d1,836</i>	<i>d5,331</i>	<i>d5,065</i>	<i>d2,841</i>
Hudson	11,595	325	<i>d1,991</i>	<i>d5,429</i>	8,180	6,518	1,597	.....	3,415	<i>d8,460</i>	<i>d10,121</i>	<i>d8,460</i>
Hupp	3,469	<i>d923</i>	<i>d4,249</i>	<i>d4,515</i>	2,760	2,239	.....	.....	709	<i>d3,162</i>	<i>d4,249</i>	<i>d4,515</i>
Mack	6,841	2,008	<i>d3,032</i>	<i>d1,480</i>	4,534	4,163	1,680	692	2,307	<i>d2,156</i>	<i>d4,713</i>	<i>d2,172</i>
Nash	18,014	7,601	4,808	1,030	16,380	13,650	9,555	4,095	1,634	<i>d6,049</i>	<i>d4,747</i>	<i>d3,065</i>
Packard	25,183	9,034	<i>d2,909</i>	<i>d6,824</i>	17,234	9,741	6,746	.....	7,949	<i>d707</i>	<i>d9,655</i>	<i>d6,824</i>
Reo	1,074	<i>d1,989</i>	<i>d2,749</i>	<i>d2,879</i>	2,400	1,600	772	.....	<i>d1,326</i>	<i>d3,589</i>	<i>d3,521</i>	<i>d2,879</i>
Studebaker	11,346	1,000	860	<i>d8,280</i>	10,387	8,277	2,814	993	1,310	<i>d6,828</i>	<i>d1,954</i>	<i>d9,272</i>
White	2,548	<i>d474</i>	<i>d3,235</i>	<i>d3,619</i>	1,000	1,503	355	3,125	1,548	<i>d1,976</i>	<i>d3,590</i>	<i>d6,744</i>
Total	\$105,575	\$12,865	<i>d\$12,184</i>	<i>d\$47,036</i>	\$77,288	\$59,882	\$29,084	\$14,160	\$27,234	\$48,835	\$47,802	\$64,226

Only Graham and Studebaker had outstanding preferred stock

	Cash				Securities				Cash and Securities			
	1929	1930	1931	1932	1929	1930	1931	1932	1929	1930	1931	1932
Auburn	\$1,487	\$2,655	\$4,012	\$1,938	\$595	\$2,061	\$4,398	\$3,200	\$2,082	\$4,716	\$8,410	\$5,138
Chrysler	36,978	32,145	23,201	33,736	1,728	9,499	27,032	8,867	38,706	41,644	50,233	42,603
Graham	2,985	1,906	1,482	510	3,195	1,089	.....	18	6,180	2,995	1,482	528
Hudson	4,760	4,953	1,841	2,110	12,385	9,030	7,068	2,089	17,145	13,983	8,909	4,199
Hupp	3,962	3,725	2,987	2,578	6,194	6,188	4,109	2,326	10,156	9,913	7,096	4,904
Mack	1,899	3,116	4,041	9,468	.....	.....	3,000	300	1,899	3,116	7,041	9,768
Nash	17,214	13,948	12,005	4,349	24,797	24,147	24,545	27,786	42,011	38,095	36,550	32,135
Packard	4,450	4,166	3,413	3,340	13,460	14,446	10,582	10,047	17,910	18,612	13,995	13,387
Reo	5,883	4,185	3,865	4,700	3,680	3,830	2,294	1,272	9,563	8,015	6,159	5,972
Studebaker	5,113	7,852	9,932	9,644	.....	.....	.....	400	5,113	7,852	9,932	10,044
White	1,433	1,256	4,057	*	9,224	8,552	4,573	*	10,657	9,808	8,630	*
Total	\$86,164	\$79,907	\$70,836	\$72,373	\$75,258	\$78,842	\$87,601	\$56,305	\$161,422	\$158,749	\$158,437	\$128,678

*Consolidated with Studebaker.

Car Price Increases—Part II

	Inventories				Current Assets				Current Liabilities			
	1929	1930	1931	1932	1929	1930	1931	1932	1929	1930	1931	1932
Auburn	\$8,754	\$5,158	\$4,454	\$4,011	\$13,327	\$12,270	\$14,401	\$10,898	\$3,296	\$2,831	\$1,924	\$330
Chrysler	38,102	26,055	22,104	18,377	90,313	74,029	76,320	65,682	18,928	11,455	11,328	16,395
Graham	7,343	5,430	2,555	1,410	14,554	9,159	4,647	2,163	2,984	3,032	2,619	1,297
Hudson	13,467	6,844	4,476	3,615	34,474	25,133	14,749	8,666	8,271	5,301	3,590	2,200
Hupp	8,481	5,859	4,271	2,115	19,882	16,173	11,926	7,283	2,541	1,728	1,715	1,074
Mack	20,306	15,967	10,369	9,047	44,293	37,196	32,225	29,205	7,209	2,377	1,632	1,667
Nash	5,246	2,768	1,348	1,023	53,141	43,388	39,787	34,145	8,860	5,758	2,710	1,145
Packard	13,624	11,092	7,874	5,763	38,080	33,969	24,519	20,450	13,204	5,993	3,123	2,325
Reo	10,051	6,675	5,200	3,454	22,688	17,385	12,434	9,984	2,717	1,663	1,398	849
Studebaker	26,083	17,692	16,211	17,410	35,773	29,264	30,202	33,234	9,988	10,586	13,644	11,453
White	15,566	13,992	9,219	*	32,197	27,779	23,460	*	3,176	1,910	1,353	*
Total	\$167,023	\$117,532	\$88,081	\$66,225	\$398,722	\$325,745	\$284,670	\$221,710	\$81,174	\$52,634	\$45,036	\$38,735

*Consolidated with Studebaker.

	Working Capital				Plant and Property—Depreciated				Depreciation Reserve			
	1929	1930	1931	1932	1929	1930	1931	1932	1929	1930	1931	1932
Auburn	\$10,031	\$9,439	\$12,477	\$10,568	\$7,075	\$7,810	\$7,834	\$7,343	\$3,115	\$2,837	\$3,319	\$3,939
Chrysler	71,385	62,574	64,992	49,286	83,624	74,173	65,513	61,697	47,511	52,595	59,444	64,822
Graham	11,570	6,127	2,028	866	13,987	12,907	11,843	6,640	3,783	4,677	5,357	.....
Hudson	26,203	19,832	11,159	6,466	33,276	30,173	29,338	25,614	18,353	21,723	24,163	23,744
Hupp	17,342	14,445	10,211	6,209	16,407	13,828	11,315	7,167	7,681	8,904	10,182	6,899
Mack	37,084	34,819	30,593	27,538	20,506	19,366	17,184	16,643	13,136	14,963	17,237	17,704
Nash	44,281	37,630	37,077	33,000	9,161	8,343	6,819	6,029	6,678	6,923	7,161	7,410
Packard	24,876	27,976	21,396	18,125	37,870	35,911	33,442	31,319	13,672	13,336	14,199	14,494
Reo	19,972	15,722	11,036	9,135	10,689	10,335	9,663	4,646	9,421	7,651	8,371	4,756
Studebaker	25,785	18,677	16,558	21,781	59,077	57,726	55,668	58,513	15,050	16,796	17,975	28,242
White	29,021	25,870	22,107	*	9,634	9,187	8,545	*	6,116	6,792	7,491	*
Total	\$317,550	\$273,111	\$239,634	\$182,974	\$301,306	\$279,759	\$257,164	\$225,611	\$136,950	\$152,520	\$164,185	\$172,010

*Consolidated with Studebaker.

Totals do not include Graham.

	Capital Stock				Surplus				Capital and Surplus			
	1929	1930	1931	1932	1929	1930	1931	1932	1929	1930	1931	1932
Auburn	\$7,993	\$9,045	\$9,849	\$10,714	\$6,210	\$5,683	\$7,596	\$4,859	\$14,203	\$14,728	\$17,445	\$15,573
Chrysler	73,756	73,263	73,122	21,847	54,087	42,763	39,679	52,695	127,843	116,026	112,801	74,542
Graham	14,004	13,826	13,690	3,788	8,570	3,218	21,823	2,071	22,574	17,044	11,867	5,859
Hudson	19,958	19,958	19,958	19,958	38,726	30,266	20,146	11,686	58,684	50,224	40,104	31,644
Hupp	14,754	15,121	13,319	13,291	18,942	13,807	9,443	2,013	33,696	28,928	22,762	15,304
Mack	3,900	3,940	3,940	3,381	54,761	52,110	47,397	41,490	58,661	56,050	51,337	44,871
Nash	13,887	13,887	13,887	13,887	39,771	33,722	29,123	26,301	53,658	47,609	43,010	40,188
Packard	50,000	50,000	50,000	40,000	15,584	14,877	5,223	8,398	65,584	64,877	55,223	48,398
Reo	20,000	20,000	18,105	9,000	10,834	7,296	3,874	5,284	30,834	27,296	21,979	14,284
Studebaker	93,311	90,473	88,311	59,627	23,272	10,817	7,876	12,192	116,583	101,290	96,187	71,819
White	40,000	40,000	32,500	*	8,678	6,991	7,979	*	48,678	46,991	40,479	*
Total	\$351,563	\$349,513	\$336,681	\$195,493	\$279,435	\$221,550	\$176,513	\$166,989	\$630,998	\$571,063	\$513,194	\$362,482

*Consolidated with Studebaker.

	Good-Will, Patents, etc.				Capital and Surplus less Good-Will, etc.				Funded Debt—Bonds, Debentures, etc.			
	1929	1930	1931	1932	1929	1930	1931	1932	1929	1930	1931	1932
Auburn .....	.....	.....	.....	.....	\$14,203	\$14,728	\$17,445	\$15,573	\$512	\$397	\$359	\$131
Chrysler	\$25,000	\$25,000	\$25,000	.....	102,843	91,026	87,801	74,542	49,765	47,583	44,411	42,331
Graham .....	.....	.....	.....	.....	22,574	17,044	11,867	5,859	3,125	2,900	2,325	1,805
Hudson .....	.....	.....	.....	.....	58,684	50,224	40,104	31,644	.....	.....	.....	.....
Hupp .....	.....	.....	.....	.....	33,696	28,928	22,762	15,304	.....	.....	.....	.....
Mack	2,438	2,438	2,438	\$2,438	56,223	53,612	48,899	42,433	2,200	2,000	1,800	541
Nash .....	.....	.....	.....	.....	53,658	47,609	43,010	40,188	.....	.....	.....	.....
Packard .....	.....	.....	.....	.....	65,584	64,877	55,223	48,398	.....	.....	.....	.....
Reo .....	.....	.....	.....	.....	30,834	27,296	21,979	14,284	.....	.....	.....	.....
Studebaker	19,807	19,807	19,807	5,389	96,776	81,483	76,380	66,430	346	332	356	16,093
White	5,389	5,389	5,389	*	43,289	41,602	35,090	*	42	39	.....	*
Total	\$52,634	\$52,634	\$52,634	\$7,827	\$578,364	\$518,429	\$460,560	\$354,655	\$55,990	\$53,251	\$49,251	\$60,901

*Consolidated with Studebaker.

May 6, 1933

Automotive Industries

Correct Grade Selection Emphasized

Careful study of limiting requirements of individual application will help to specify proper type of material for elevated temperature, corrosion resistance, decorative effect, structural properties

STAINLESS steel in its present state of development made an auspicious bow to a huge gathering of engineers in New York on April 26. The occasion was an exhibition of stainless steel products and an evening technical session sponsored by the Metropolitan sections of the A.S.M.E., the A.W.S. and three other national engineering societies.

The technical session with George H. Charls, secretary of the American Iron and Steel Institute presiding, consisted of papers by three of

by Joseph Geschelin

Engineering Editor, Automotive Industries

engineer, subsidiary companies, U. S. Steel Corp.

According to Dr. Mitchell, industry has available a wide variety of stainless steels each suited to some specific operating conditions. It is important to study the varieties and select the grade that best fits the limiting requirements of the individual problem. The symposium developed the useful properties of stainless steels, particularly at elevated temperatures. And new light was shed on the role of other elements which may be alloyed with stainless steels to develop special properties.

Believe it or not, the registration at the exhibit, which was held in the lobby of the Engineering Societies Building, exceeded 700. Among the exhibitors were the National Tube Co., showing a wide range of seamless stainless steel tubing in different shapes and sizes; the Lebanon Steel Foundry with a variety of castings of alloy steels and stainless alloys; and E. G. Budd Mfg. Co., with some structural stainless steel sections from its well-known railcar, also a roof-rib and a floor section from the newly developed truck body.

At the close of the meeting, those present were treated to a film showing the Budd railcar under construction and on the rails.

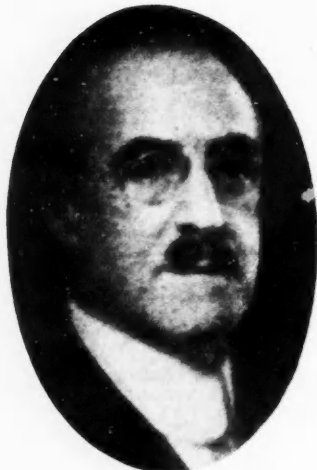
Dr. Grossman devoted a considerable part of his paper to the historical background of stainless steel, also to specific discussion of the applications of stainless steels in various industries, particularly oil refineries. It is of interest to know that the present varieties of stainless steels fall into two classes

—straight chromium steels, of which 17 per cent chromium is typical, are largely ferritic at all temperatures; and the chrome-nickel, of which 18-8 is typical, are substantially austenitic at all temperatures.

Because the 18-8 steels are unusually ductile, in sheet form they may be drawn into shapes that are not possible with carbon steel. But they harden through cold-working and must be annealed at about 1850 deg. F. or higher to obtain maximum ductility where further drawing is necessary. The phenomenon of cold-work hardening also interferes with free machining properties of these alloys.

Much work has been done in studying the effects of other alloys as additions to the composition of straight chrome and 18-8 stainless steels. Dr. Grossman describes the effects of several commonly-used alloys as follows:

"Molybdenum has been used in amounts up to about three per cent, for improving certain kinds of acid resistance. Copper has likewise



Dr. Frederick M. Becket

the leading authorities in the field of metallurgy. Its scope is suggested by the titles of the three papers: "Development of Stainless Steels and the Present State of the Art," by Marcus A. Grossman, research engineer, Illinois Steel Co.; "Heat Resisting Steels," by Frederick M. Becket, president, Union Carbide & Carbon Research Laboratory, Inc.; and "Uses and Applications of Stainless Steels," by Walter M. Mitchell, metallurgical



Dr. Marcus A. Grossman

at Stainless Steel Symposium

been used in amounts up to one per cent in an attempt to improve certain acid resistance. Tungsten has been used in amounts up to about three or four per cent, in order to increase the strength at elevated temperatures. Silicon has been used in amounts up to two per cent to improve the resistance to oxidation or scaling at elevated temperatures. Manganese has been used in various amounts from two to eight per cent to improve the ductility.

"Mention should also be made of the use of titanium to reduce intergranular corrosion. This intergranular corrosion, which at the same time causes a drastic loss of ductility (embrittlement), is a special type of deterioration which may set in when 18-8 stainless has been heated in the range approximately 1200 to 1400 deg. F. Its nature is perhaps too involved to be discussed at length here and it may suffice to say that it is a secondary effect arising from the precipitation of carbides which is the primary effect of this heating. The addition of certain small amounts of titanium prevents the secondary effect, although the primary effect still takes place."



Dr. Walter M. Mitchell

Heat - resistant steels, particularly those required to resist high-temperature oxidation, were described by Dr. Becket. This group consists chiefly of plain chromium steels ranging from 4-35 per cent chromium, also grades containing some nickel, carbon and other elements. One of the most valuable alloys is the 12-14 per cent chromium steel largely used for engine valves.

Dr. Becket cited some cases where castings of certain of these alloys are used to replace cast iron which has a tendency to grow under severe operating conditions. For high temperatures, 20 per cent chromium is found to be the critical value. Below this chromium content the alloy is not very effective if the temperature ranges above 1000 deg. C. The pressures and temperatures occurring in hydrogenation processes demand steels containing more than 20 per cent chromium, and some nickel.

Nickel is valuable where increased strength and toughness are required of the stainless steel product.

In discussing the applications of stainless steels, Dr. Mitchell chose to consider the matter as one based on the theory of usefulness. Thus the designer has available a wide range of stainless steels, each having special properties and a special field of application. Selection depends entirely upon the requirements of the individual problem. These usually fall within two classes: (1) corrosion resistance including resistance to high temperature oxidation, also for decoration
(Turn to page 561, please)

Properties of U. S. S. Stainless and Heat-Resisting Steels

(From table compiled April, 1933, U. S. Steel Corp., Research Lab.)

Type of Alloy.....	4-6 Cr		USS 12*		USS 17		USS 27		USS 18-8		USS 18-8 Stabilized Modification of USS 18-8 containing titanium (ratio to carbon content approx. 6:1)	USS 18-12		USS 25-12	
Composition: Chromium, per cent	4-6		12-14		16-18		25-30		17-19			17-19		22-28	
Nickel, per cent.....	0.50		0.50		0.50		0.50		8-10			11-12.5		12-16	
Si and Mn (max.), per cent. Carbon, per cent.....	0.10-0.20		0.10 max.		0.10 max.		0.10 max.		0.05-0.15			0.05-0.15		0.25 max.	
MECHANICAL PROPERTIES AT ROOM TEMPERATURE	Annealed	Quenched and drawn at 1100 deg. F	Annealed	Quenched and drawn at 1100 deg. F	Annealed	Cold-worked (wire)	Annealed	Cold-worked (wire)	Annealed	Cold-worked (wire)	Stabilized	Annealed	Cold-worked (wire)	Annealed	Cold-worked (wire)
Ultimate strength: 10 ³ lb./sq. in.	66	115	65	125	75	100-190	75-95	85-175	80-90	105-300	85-95	80-90	105-275	90-110	110-270
Yield point: 10 ³ lb./sq. in.	27	103	35	100	40	40	50-60	55-155	40	60-250	40-45	40	40	40-60	65-230
Elastic modulus: 10 ⁶ lb./sq. in.	38	20	35	20	29	25-2(10")	20-30	25-2(10")	29	50-2(10")	55	60	50-2(10")	35-50	35-2(10")
Elongation in 2 in., per cent.....	76	66	65	60	55	40-20	50-60	55-25	70	65-30	55	65	65-30	45-60	55-20
Reduction in area, per cent.....				75							77				
Impact ft. lb. { Charpy.....	80	75	80		8-25				75-110						
{ Izod.....															
Fatigue resistance endurance limit: 10 ³ lb./sq. in.									47						
Brinell hardness number.....	136	250	140	230	175	185-270	160-190	150-250	135-165	170-460	150-185	135-165	170-380	150-185	170-375
Rockwell hardness number.....	B75	C24	B76	C22	B85	B90-105	B80-90	C0-25	B75-85	C5-47	B80-90	B75-85	C5-40	B80-90	C5-40
Riichsen value, mm.....					7-9				11-14						
Stress causing 1 per cent "creep" in 10000 hr lb./sq. in.	at 1000 deg. F = 7,000		1000deg. F = 13,000		1000 deg. F = 8,500		1200 deg. F = 1,600		1000deg. F = 17,000			1500deg. F = 15,000 (unconfirmed)			
			1200deg. F = 2,300		1200 deg. F = 2,100		1350 deg. F = 400		1200deg. F = 7,000						
			1350deg. F = 1,400		1350 deg. F = 1,200				1350deg. F = 3,000						
									1500deg. F = 850						
Sealing temperature, deg. F (approx.) ..	1200		1300		1550		2100		1650		1650	1650		2100	

*A modification of USS12 with similar properties but greater ease of machining has been developed and designated USS 12 Z.

Glycol Cooling and Retractable Radiator Feature New German Transport Plane



(Right) New high-speed Heinkel transport plane, showing retractable landing gear

(Above) This view shows the glycol cooler, which also is retractable

INTEREST in ethylene glycol cooling for aircraft engines has spread to Germany, for the Ernst Heinkel Aircraft Works of Warnemuende announce the successful completion of official tests of a new high-speed transport plane for the German Luft Hansa in which this form of cooling is used. Two views of the forward part of the plane are shown herewith. In tests conducted by the German Aeronautic Testing Establishment, the plane is said to have attained a speed of 226.25 m.p.h. The ship has a crew of two and has accommodations for five passengers with baggage, the payload being 1100 lb., the useful load, 2222 lb., and the gross weight, 7282 lb.

To make the high speed possible, both the landing gear and the tail skid are so arranged that they can be fully retracted into the wing and

the fuselage respectively. To keep the surface of the fuselage as smooth as possible, even the door handles are located in recesses. The engine is a B. M. W. direct-drive model developing 650 hp. at 1600 r.p.m. One of the views shows the glycol radiator very clearly. This also can be retracted into the fuselage.

The retractable landing is another feature of interest. When the wheels are down, the truss supporting them is of tripod type, allowing of the use of conventional shock absorbers with a long travel and a simple brake system. To retract the gear, the wheels are swung about a fore-and-aft axis, outward and upward into the wing. They swing about the upper end of the Oelo shock absorber strut and the upper end of the rear brace strut. A side brace member in-

board of the wheels has its upper end slide outward on a track, raising the wheels, which are of 35 by 8-in. size. An hydraulic piston and cylinder actuates a cable raising the wheels. Fairing covers are provided for the wheels and struts, so that when the gear is retracted there is no opening or break to spoil the air flow over the wing. All windows are of nonshatterable glass and curved to the outline of the fuselage.

Parts Makers Role Gets Bigger

(Continued from page 548)

industries and independent inventors have led in development work are those of centralized chassis lubrication, spring shackles, and shock absorbers. This does not exhaust the subject by any means, and nothing has been said about new materials and new processes specially developed for use in the production of automobiles, which may form the subject of another article. Enough evidence has been submitted, however, to show that the American automobile industry in its climb to the premier position among similar industries throughout the world has been strongly supported by a parts and accessories industry that is well equipped both technically and industrially.

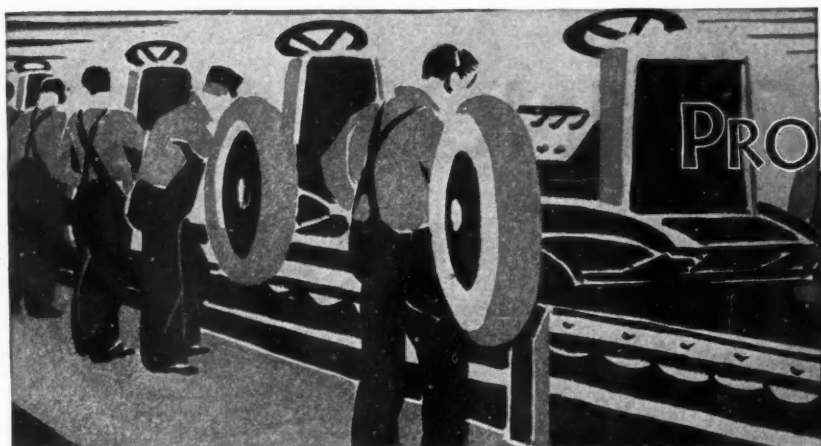
Detail development of mechanical equipment to a high degree of refinement calls for different talents—a somewhat different type of mentality—than the pioneer development of an entirely new product, and there is no doubt that a great deal of this type of talent that is capable of concentrating on details and does not tire of further effort even though returns become increasingly smaller, is associated with the American parts and accessories industry.

The American automobile industry owes much to its parts and accessories industry.

Stainless Steel Panels for Truck Body

STAINLESS steel is used for the panels of a truck body built for a paint concern in the shops of Mack Trucks, Inc., Long Island City, N. Y. The reasons for the selection of this chromium-nickel steel for the panelling are said to be that it gives a permanently pol-

ished appearance, offers high resistance to corrosive attack by the atmosphere and many chemical reagents, has great tensile strength and stiffness, permits of hammering out dents with ease, and will last the life of the truck, barring serious accidents.



PRODUCTION LINES

Nickel's Worth

Robert C. Stanley, speaking at the annual banquet of The Canadian Institute of Mining and Metallurgy on April 6, "In the past five years Canadian companies have sold 203,000 tons of nickel distributed as follows:

The United States consumed approximately	53½%
Great Britain	9½%
Germany	9½%
France	7½%
Russia	7%
Japan	3%
Italy	2½%
Unclassified	7%
and Canada	½%

"It was because of this distribution that we recommended to the Ottawa Conference that Canada should exert her influence in maintaining a free and unrestricted world market for nickel, since it was so obviously an export commodity."

It Can Be Done

Several times we have suggested the possibility of converting a husky gasoline to a Diesel (or C. I.) engine. Such convertibility should entail, in the main, only a new cylinder head and an injection system. Was told on occasion that it couldn't be done. Comes a prominent Diesel maker who is building a line of heavy-duty, low speed engines based on this principle. Now the only question is—can it be done on a real high-speed job? Ifs and ands are solicited.

Sizing Grains

Based upon laboratory experience over a period of ten years, a tentative standard grain size chart for the classification of steels has

been issued by the A.S.T.M. This chart shows eight ranges of grain sizes for hypereutectoid steels and a similar number for hypo-eutectoid. Single copies of the chart are 25 cents. Get it from Philadelphia headquarters of the A.S.T.M.

Rational Speeds

A proposed American standard for machine speeds is offered to industry by the American Standards Association. Those interested are urged to study the tentative standard and comment upon it. The economic significance of machine speed standardization is found in an article, "The Significance of Speed Standardization," by Decker and Acres, Mechanical Engineering, April, 1933.

Needs Quick Action

It behooves petroleum technologists to find out quickly the merits or demerits of alcohol-gasoline fuel mixtures. Qualitatively, a lot is known; quantitatively, we are at sea. The Bureau of Standards exposes many disadvantages arising from additions of alcohol. You'll find its reports in the Technical News Bulletin No. 191, for March. Literature distributed by proponents of the measure does not agree with the most important findings of the Bureau. Let's have the facts before it's too late.

Other Side

Ordinary machine shop procedure no longer holds when it comes to the manufacture of piston rings. The simple-looking cast iron ring is in reality a delicately balanced structure with all internal stresses under control. Or it doesn't work. In machining the ring all cuts are

balanced, the same number being taken on each surface. Although tungsten carbide tooling is used in many cases, the speeds may not be as high as in ordinary machining practice if local stresses are to be held down.

Veritas Vincit

Labor statistics issued by the U. S. Public Employment Service are branded unreliable and will be discontinued by the new Secretary of Labor, Miss Frances Perkins. In a recent interview, she commended the fact finding machinery of the Bureau of Labor Statistics and said that henceforth its statistics would be used by her department. Outside agencies are being engaged to study and revise the statistical methods of the Labor Department. Special attention is to be given to data on wage cuts and cost of living. Further developments should be of vital interest to automotive executives.

Centrifugal Steel

Westinghouse is building electrical equipment for a new plant for the Rotary Steel Co., located near Detroit. Steel will be made in an electric furnace and cast centrifugally in a rotating circular mold. When cooled, the ring is cut into billets and rolled in the usual manner.

Temperature Finder

Westinghouse gives us "Electro-temp," a centralized temperature recorder. It comes with many leads connecting search coils in various departments. Thus, from a remote station, it is possible to check the temperature at any given point by plugging the right lead to the recorder. Seems to have plenty of industrial possibilities.—J. G.



Are We COMING to HIGH-TRACTOR

THERE has been little technical development in farm tractors for a good many years past, but it seems that an effort is now to be made to apply to tractor-engine design the advances which have been made in internal-combustion engines in connection with their application to passenger cars. We are informed that tractors with high-compression engines are undergoing tests by the board of testing engineers of the University of Nebraska, and that it was planned to offer tractors having such engines to farmers in time to make them available for the spring work this year. The chief advantage which a tractor of the high-compression type would offer would be a higher thermal efficiency or, what amounts to the same thing, reduced fuel consumption for the same work.

When tractors were first developed for farm work, their engines for the most part were designed to burn kerosene. At that time (about 1912) kerosene was considerably cheaper than gasoline, and the economy of the cheaper fuel appealed to the farmer. Although the conditions for the use of a fuel of low volatility are exceptionally favorable in a farm tractor, because the load factor of the engine is high and substantially constant, considerable difficulty was experienced with kerosene. Many farmers who bought kerosene-burning tractors found it advantageous to use gasoline as fuel, and the practice soon became so general that tractor manufacturers, and especially new ones just entering the market, built tractors designed for the use of gasoline exclusively.

The writer was told at that time by an engineer specializing on carburetors for tractor work that unless kerosene cost less than two-thirds as much as gasoline, a farmer was not warranted in burning it. In the first place, there is more difficulty in starting a kerosene-burning engine. Secondly, although there is more heat in a gallon of kerosene than in a gallon of gasoline, owing to incomplete

vaporization of the kerosene and consequent unequal distribution, etc., the thermal efficiency of the engine is lower with kerosene and fewer horse-power hours of useful work are obtained from a gallon. Thirdly, the crankcase oil is diluted much more rapidly than with gasoline, and in tractor tests certain competitors using kerosene drained their crankcases every night, which meant, of course, a considerable expenditure for lubricating oil. There are also certain minor disadvantages inherent in the use of kerosene, such as smoke in the exhaust when starting after a period of rest, "messiness," and a more unpleasant smell. The only advantage of kerosene as compared with

gasoline, aside from its lower cost, was its greater safety.

During recent years the price of kerosene has approached that of gasoline and the principal reason for designing the early tractors for the use of kerosene has therefore vanished. This is reflected by recent practice in design. Of 35 tractors which have been officially tested by the Board of Tractor Engineers of the University of Nebraska during the last three years, 22 used gasoline in the test, nine kerosene, and 3 distillate (a product marketed principally on the Pacific Coast and intermediate between gasoline and kerosene with respect to volatility). One of the tractors tested had a Diesel engine and op-

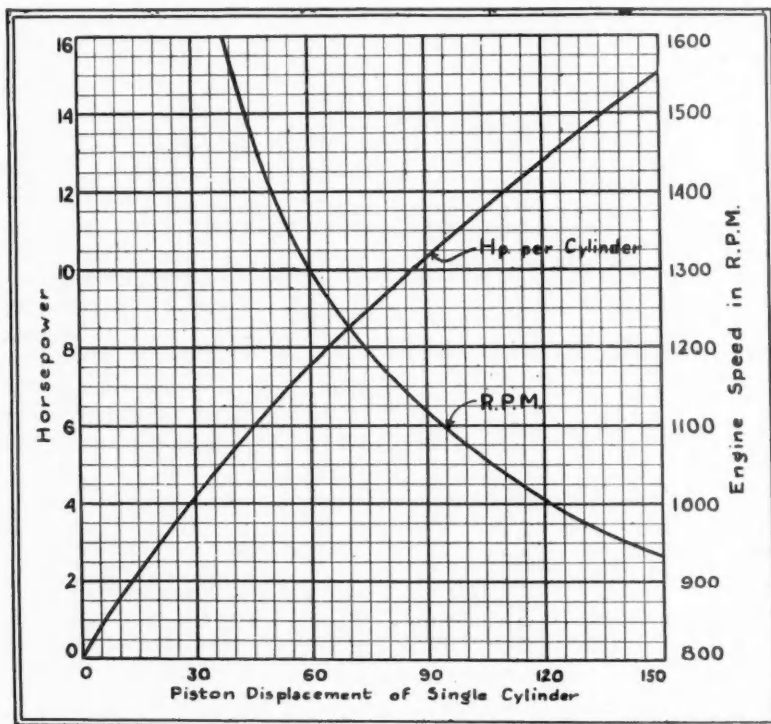


Fig. 1—Variation of engine speed and horse power with cylinder size in traction engines

COMPRESSION ENGINES?

by P. M. Heldt

Engineering Editor,
Automotive Industries

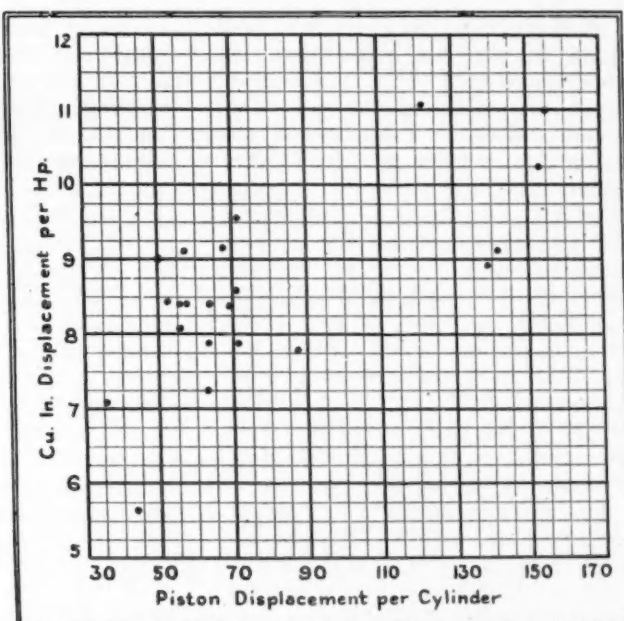


Fig. 2—Variation of specific displacement with cylinder size

Averaged Data of Gasoline-Burning Tractor Engines

		R.P.M.	B.M.E.P.	Cu. In. Per H.P.
Engine with 327-cu. in. cylinders...	(1)	650	73.0 lb.	16.7
Engines with 120-155 cu. in. cylinders...	(5)	960	81.3	10.1
Engines with 50-72 cu. in. cylinders...	(14)	1,260	73.2	8.6
Engines with 30-45 cu. in. cylinders...	(2)	1,550	81.3	6.3

erated on fuel oil. Of the twelve tractors tested in 1932 only a single one was operated on kerosene.

From an analysis of the results of the Nebraska tests it is found that the b.m.e.p. of the engines tested on kerosene was almost as high as that of those tested on gasoline, which is rather surprising, in view of the well-known fact that kerosene has a very low anti-knock value and calls for the use of a low compression ratio. The average b.m.e.p. of twenty gasoline-burning tractor engines tested during the last three years was a trifle over 76 lb. per sq. in., as compared with an average of 73.3 lb. per sq. in. for nine kerosene-burning engines. The difference is so slight, and so many of the kerosene engines showed higher b.m.e.p.'s than some of the engines tested on gasoline that it would seem that some of the latter were really designed so they could use kerosene if the owner preferred.

There was only one tractor which was tested both as a kerosene burner and as a gasoline burner, and that was the Fordson. With kerosene it developed a b.m.e.p. of 62.4 lb. per sq. in. and with gasoline, 78.3 lb. per sq. in. This points to a materially higher compression ratio being used in the gasoline en-

gine or to better cylinder filling.

Aside from the higher economy resulting from the increased thermal efficiency due to the higher compression ratio, a saving would accrue from the fact that with increased compression the specific weight of the engine is increased and for the same performance a smaller and lighter engine can be used, so that not so much weight needs to be lugged around the field. Of course, an increase in the compression ratio alone would not reduce the weight of the engine so very much, and if fuel economy through weight reduction were to be pursued to its logical conclusion, the speed of the engines would have to be increased. However, there are definite limitations to a decrease in the weight of tractor engines, because the weight of the engine forms a very considerable fraction of the whole tractor weight, on which the maximum drawbar pull which the tractor can develop without slipping of the wheels depends.

In Fig. 2 are plotted the cu. in. per hp. on a base of cu. in. per cylinder of all of the gasoline-burning tractors tested in Nebraska during the last three years, with the exception of the Caterpillar 65,

which has such large cylinders that it falls outside the chart. It will be seen that there are essentially two groups of engines, one having displacements of between 50 and 75 cu. in. and the other between 120 and 155 cu. in. per cylinder. There are fourteen engines in the former group and five in the latter. The average brake mean effective pressure of the engines in the first group, on the basis of the maximum horse power developed by them in the Nebraska tests, is 73 lb. per sq. in., and that of the second group, 81.3 lb. per sq. in. The first group develop one horse power for every 8.6 cu. in. of piston displacement, the second group for 10.1 cu. in.

There are two among the gasoline tractors tested in the period covered which have engine cylinders of less than 45 cu. in. displacement each, and of these one, owing to operation at a speed of 1600 r.p.m., develops one horse power for 5.67 cu. in. of displacement. On the other extreme we have an engine with a displacement of 327 cu. in. per cylinder, which develops one horse power for every 16.7 cu. in. of displacement.

In the table the average speeds of revolution, average b.m.e.p.'s and average numbers of cu. in. of piston displacement per horse power are plotted for the different cylinder sizes. So far as can be seen from the figures given, the b.m.e.p. is not dependent in the cylinder size, but the speed of revolution decreases rapidly as the size of the individual cylinder increases.

Passenger-car engines of 1932 model develop one horse power on an average of 2.83 cu. in. displacement, according to the manufacturers ratings. Probably, if the horse power tests were conducted under the rigid rules of the Nebraska tractor tests, in which one and the same carburetor setting is used for both the power and the economy tests, an average of 3 cu. in. would be required per brake horse power developed. Even then the modern passenger-car engine has more than twice the specific output of the tractor engines most advanced from this particular point of view.

For a long time truck engines were far behind passenger-car engines with respect to specific output, chiefly owing to their low operating speeds, 1000-1400 r.p.m., but when the introduction of pneumatic tires made greatly increased road speeds possible and called for a great increase in engine power, these engines were redesigned on lines similar to those followed in passenger-car practice. Six and eight-cylinder engines were adopted, the reciprocating parts were lightened, and valve ports and passages were increased, so that now many truck engines develop one horse power for about 4 cu. in. of displacement. In truck work the power had to be roughly doubled, and it was found to be more practical to increase the engine speed and b.m.e.p. than to double the weight.

In tractor work the situation is, of course, rather different. The principal demand is for a decrease in the operating cost, and in a farm tractor this can hardly be achieved by an increase in operating speed. The increase in economy would have to come from a decrease in first

cost and from a decrease in running expenses. If the specific output of tractor engines is increased, a smaller engine will do the same work, and it is conceivable that the smaller engine could be built more economically, even though, on account of its higher speed and higher compression, it would have to be built somewhat more carefully with respect to balancing, cylinder seal, etc. The higher economy of running would have to come chiefly from an increase in compression. The average b.m.e.p. of 73 lb. per sq. in. is probably obtained with a compression ratio of about 4.5 to 1. If this could be increased to 6.5 to 1, and the same fuel be used, the amount of work done with a

given quantity of fuel could be increased by from 20 to 25 per cent. If, besides, the speed of rotation could be increased from the present average of about 1250 r.p.m. to perhaps 1750 r.p.m., the specific output could be increased some 80 per cent and a horse power developed for every 5 cu. in. piston displacement. And there is no reason to believe that a tractor engine working perhaps 35 full days a year could not be made to have a satisfactory life if designed to develop one horse power per 5 cu. in. if truck engines, developing one horse power per 4 cu. in. displacement, are satisfactory, even though the number of full days' work per year of the average truck is much greater.

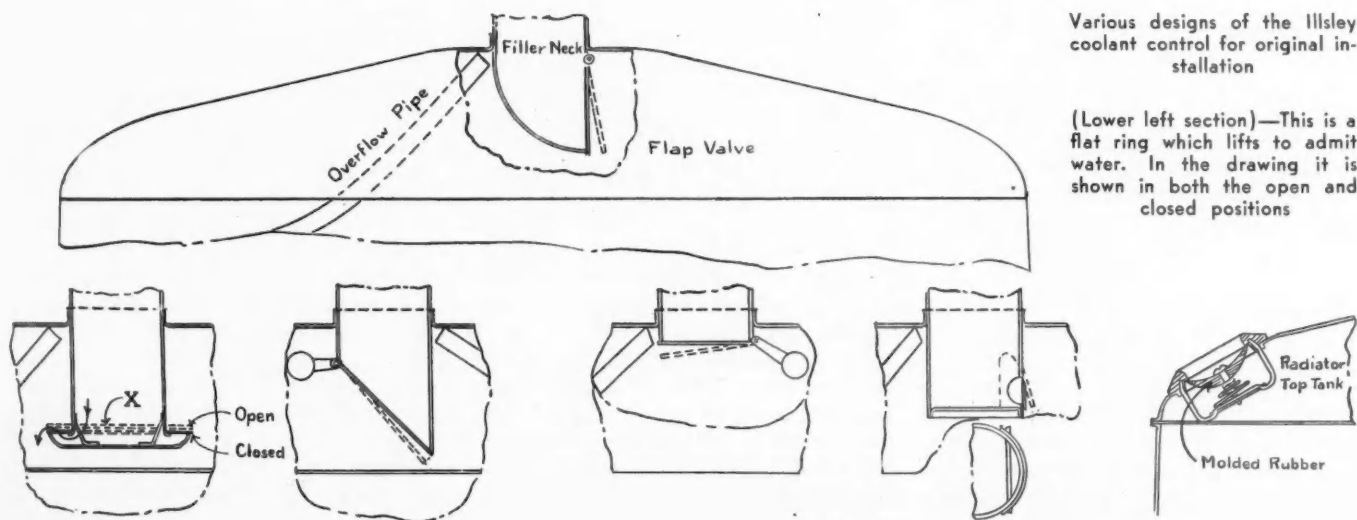
"Coolant Control" Devices for Water and Anti-Freeze Conservation

TO prevent loss of anti-freeze or water from the cooling system, due to overheating, evaporation or surging into the header tank and out of the overflow pipe, Illsley Company, 38 Piquette Street, Detroit, has recently introduced a "coolant control" which consists of a simple diaphragm type of pop-off valve which is attached to the overflow pipe. The entire device is about 3 in. in diameter and attached by a simple hose connection to the overflow pipe. Its light weight makes a separate support unnecessary.

This valve keeps the cooling system closed as long as there is only atmospheric or a moderate overpressure within it. When acute boiling occurs, however, creating excess pressure, the diaphragm is

raised off its seat (at the center), permitting gases to escape and at the same time emitting a warning whistling sound. One advantage claimed for the use of such a device is that it reduces the formation of scale in a radiator, by reducing the amount of refill water which has to be supplied. The device should be particularly effective in conserving anti-freeze alcohol, since much of the loss of alcohol is due to evaporation when the engine has been shut off and is cooling down.

For original equipment installations of this control, Illsley is offering also several types of safety filler units which automatically prevent escape through the filler "cap" when this unit is removed, while permitting the refilling of the radiator. Several of these are illustrated.



Various designs of the Illsley coolant control for original installation

(Lower left section)—This is a flat ring which lifts to admit water. In the drawing it is shown in both the open and closed positions

"Shotweld"-ing

Boosts Revenue by Cutting Truck Body Weight

ALMOST \$1600 a year in additional revenue is expected from the stainless steel body shown here, which was built by the E. G. Budd Mfg. Co., for Benjamin Moore & Co., in cooperation with the Lohse Body Corp. This body increases the pay load by more than a ton through the special light-weight construction developed by the Budd organization.

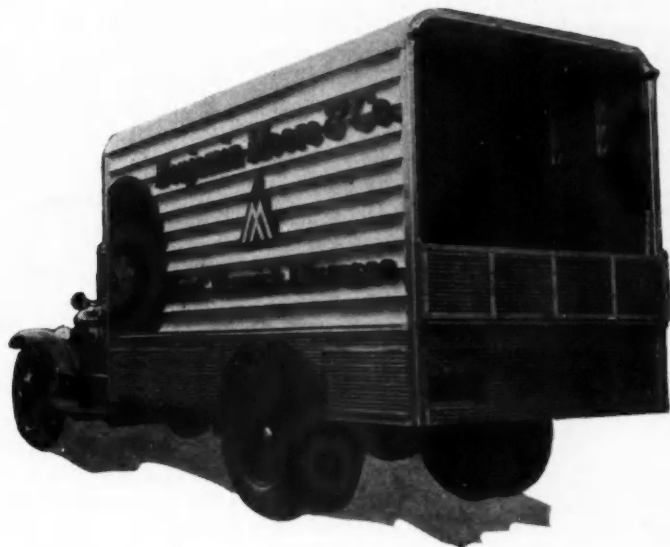
Thus "Shotweld"-ing, a patented method of producing welds in stainless steel, enters the picture as a means of building strong, but light weight truck and trailer bodies. The "Shotweld" method was described in *Automotive Industries* recently,* was originally developed by Budd for the fabrication of aircraft structure and the now well-known railcar.

The Budd construction utilizes thin, light-weight sheets of stainless steel which after rolling attain a tensile strength of about three times that of mild steel. As shown, the outer covering is built up of narrow strips rolled in a concave form and welded together into a strong enduring structure. The covering, as well as the roof ribs, posts, etc., are similar to the corresponding parts of the railcar and are fabricated with the same tools.

The specifications of the body described here are as follows:

Overall dimensions: 16 ft. 6 in. long, 7 ft. 4 in. wide, 8 ft. high, 6 ft. 3 in. headroom
Skirt boxes: Front 18 in. x 18 in. x 88 in.—
Rear 18 in. x 18 in. x 33 in.
Floor beams: High Tensile Stainless Steel
Framing: High Tensile Stainless Steel
Side Panels: High Tensile Stainless Steel
Roof: High Tensile Stainless Steel
Floor: 1½ in. oak
Sleepers: Oak

*Shot Welding Opens New Uses for Stainless Steel, by Joseph Geschelin, *Automotive Industries*, July 2, 1932.



All-stainless steel body built by the E. G. Budd Mfg. Co. of sections similar in design to those of their railcar

Total weight: 2,080 lb.
Service load capacity: 16 tons where statutory limits permit.

This body increases the pay load 2120 lb. over those of equivalent size but of different construction in use by Benjamin Moore & Co. In dollars and cents this additional pay load is said to be worth \$1,590 per year, exclusive of savings due to reduction in maintenance.

The weight saving of the "Shotweld" construction becomes more evident from a study of the following comparative analysis of bodies of equal size and capacity.

	Ash, Oak & Steel Composite Body	"Shotweld" Stainless Steel Body with Oak Floor and Sleepers
Length	16 ft. 6 in.	16 ft. 6 in.
Pay load allowance	15,880 lb.	18,000 lb.
Wood	2,730 lb.	1,130 lb.
Steel (mild)	1,300 lb.	....
Stainless steel	....	750 lb.
Lettering & decoration	200 lb.	200 lb.
	4,230 lb.	2,080 lb.

Weight per foot of length	256 lb.	125 lb.
Weight per sq. ft. of loading space	36.6 lb.	18 lb.
Ratio of pay load allowance to weight of body	3.75 to 1	8.65 to 1

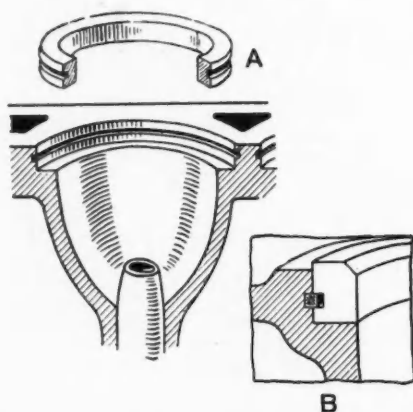
By substituting a stainless steel floor for the customary oak construction a further saving of 880 lb. is effected. The characteristics of the resulting all-stainless steel body are:

Length	16 ft. 6 in.
Pay load allowance	18,880 lb.
Weight	1,200 lb.
Weight per ft. of length	72.7 lb.
Weight per sq. ft. of loading space	10.3 lb.
Ratio of pay load to body weight	15.7 to 1

Thus "Shotwelded" stainless steel construction opens a new field of lower cost-higher profit haulage. Not only does the truck operator eliminate unprofitable and expensive dead weight but he receives a constant bonus in the form of decreased maintenance.

Ingenious Method Locks Inserted Valves in Place

"**N**O More Valve Grinding," by Joseph Geschelin, which was published in *AUTOMOTIVE INDUSTRIES*, Feb. 18, 1933, prompted a number of inquiries concerning the trend to inserted valve seats. Perhaps one of the most interesting of these is a letter from Mr. Harold



H-A inserted valve seat construction (patented) showing method of locking the insert with a split locking ring

Andrews of The Harold Andrews Grinding Co., Cheapside, Birmingham, England, specialists in fleet maintenance.

This company has worked with inserted valve seats for a number of years and has developed a patented construction which is said to make a permanent joint free of any tendency to loosen up in service. The insert is of centrifugally cast iron and is pressed into the recess in the block with an interference fit of 0.008 in.

The method of locking is effected by cutting a square-shaped groove in both insert and recess, the groove being accurately located from the bottom surfaces. Before the ring is pressed in, a split ring of square spring steel stock is assembled in the ring groove and collapsed in place by an outer sleeve. The ring is then placed over the recess and forced down through the sleeve until it bottoms. When the pressure is released, the spring expands in the groove, extending part way into the recess, thus forming an effective key.

In a recent test, this construction

resisted a pressure of 9 tons, tending to force it out, while at 10 tons the surrounding metal gave way.

Although Mr. Andrews' organization has used a centrifugal iron insert for several years, recently it has adopted a composite ring which is said to last almost indefinitely. The ring is of centrifugally cast iron but the section at the valve seat is of aluminum nickel bronze. The two metals are said to have the same

or nearly the same coefficient of expansion. Service tests have proved that the seat material resists heat and wear to a remarkable degree.

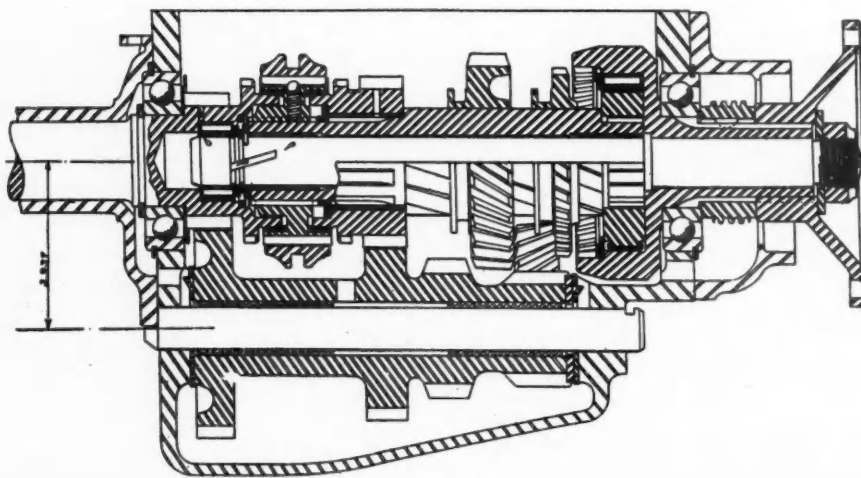
Monel Valve Seat Inserts

ARMSTRONG-SIDDELEY, a British manufacturer of aircraft engines, has adopted monel metal for valve seat inserts in the aluminum-alloy cylinder heads of its radial air-cooled engines. The inserts are produced by machining from either drop-forged blanks or hot-rolled tubing, and they are screwed into threaded recesses in the heads.

Compact Transmission Is Quiet in All Speeds

A SYNCHRONIZED-SHIFT, all-helical transmission with free-wheeling unit built in, in which the intermediate and low-speed gears are mounted on a sleeve, has been developed by Everett R. Burtnett of San Marino, Cal., and is claimed to have advantages by way of simplicity and compactness. The inner member of the free-wheeling unit is keyed to the sleeve, while the outer member is rigidly mounted on the central shaft. The low-speed gear is shifted on helical splines on the sleeve, and the free-wheeling lock-out clutch is also mounted on the sleeve. There is relative motion between the sleeve and the central shaft only when the car is free-

wheeling, hence the bearings of the sleeve on the central shaft do not run under load, and plain bearings are satisfactory. It will be noticed that both the transmission gears and the free-wheeling unit are arranged in a single compartment; this saves material, keeps down the weight, and reduces the cost of the transmission, which is intended chiefly for cars in the lower-price brackets. The sleeve itself, being of large diameter, is, of course, quite rigid, and buckling of the relatively small-diameter central shaft is said to be precluded by the fact that the bearings through which the loads are transferred to it are located at the ends, near its point of support.

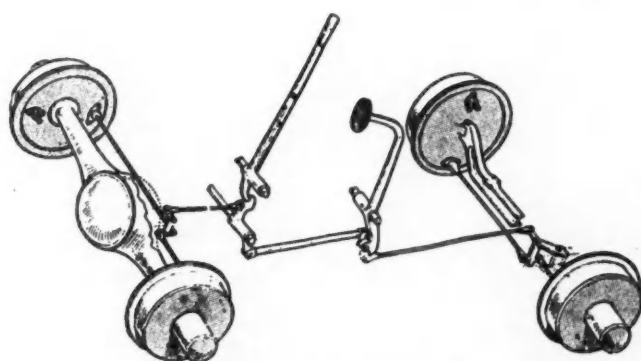


Burtnett transmission with built-in free-wheeling unit

No Long Torsional Members in Girling Brake System

A NEW design of mechanical brake, known as the Girling, has been developed in England, the rights to it having been acquired by Pratt & Manley, Birmingham. The peculiarity of the design resides in the fact that the members transmitting the force of application

From this double-armed lever a pull rod extends to the rear axle. At the front and rear axles there are short vertical shafts with double armed levers from which pull rods extend to the two brakes at that end of the car, the ends of the pull rods connecting to conical wedges



Girling brake assembly

from the brake pedal and lever to the brakes work almost entirely under direct tension, instead of largely under torsion, as in the conventional layout. The layout of the brake mechanism is shown by the accompanying drawing, which is reproduced from *The Motor*. From the pedal shaft an arm extends downwardly which carries a balance lever at its free end. From the ends of this balance lever one pull rod extends to the front axle and another to a short transverse shaft on which there is a double-armed lever that is acted on by the emergency lever.

located between rollers at the free ends of the brake shoes. These conical members are guided in the brake backing plates. When the pedal is depressed, the two conical members are drawn toward the center of the car, and the brake shoes thereby expanded.

Adjustment of the brakes is made by means of the anchoring pin. The brake shoes are pivoted on steel plungers which themselves bear on an adjusting cone. The latter is provided with a threaded stem projecting through the brake backing plate, and can be turned by means

of a wrench, thus forcing the brake shoes apart.

One advantage claimed for the Girling brake is that, since there are no long torsional members, the loss of energy which ordinarily results from twisting these members is here eliminated. A second advantage claimed is that the leverage is concentrated largely at the brake shoes, so that the members of the linkage are comparatively lightly loaded. Another feature tending toward safety is that with the method of compensation employed, breakage of any one rod affects both wheels on one axle, and so does not cause the rear to swerve from a straight course.

Messrs. Pratt & Manley also have developed a type of brake shoe made in two parts welded together. The rim is made of a special rolled section of 0.40 carbon steel, with longitudinal cooling ribs or fins. This is cut off to length, rolled up into a circle and electrically welded into a ring. The ring is counter-bored at one end and fitted to a steel disk which has been reduced in thickness near the edge. The two parts are then united by electric welding, but the weld is not continuous, and the drum therefore does not ring, hence it is not noisy when the brake is applied, according to its sponsors.

Australian Sales Bigger in 1932

TOTAL sales of new cars in Australia (including Tasmania) during the calendar year 1932 numbered 10,099, as compared with 9946 during the previous year, according to a report from U. S. Trade Commissioner Peebles in Sydney.

In 1931 American makes accounted for 79.6 per cent of new car sales; in 1932 the percentage was 64.5. American commercial vehicles sales in 1931 were 85.7 per cent of the total, in 1932 they were 73.7 per cent of the total.

In new commercial vehicle sales three low capacity ($1\frac{1}{2}$ tons) American makes accounted for 62 per cent of the total 1932 sales of American commercial vehicles, and 46 per cent of the grand total sales. The Morris truck (English) sales in 1932 totaled 229 out of an aggregate of 3323, the grand total of all makes in 1932. The English Bedford made significant gains the last half of 1932 and completed the year with 303 sales. This is a utility truck, capacities ranging from $1\frac{1}{2}$ to 5 tons.

Stainless Steel Symposium

(Continued from page 553)

tive purposes, and (2) mechanical properties such as strength, ductility, wear, resistance, etc.

The most common applications in the automotive industry are for decorative parts such as radiator shells and grilles, moldings, lamp bodies, etc.; silicon-chromium steels for engine valves; and machining grades for pump shafts etc. One of the recent developments is the use of 18-8 strip in rolled forms

and sections, as pioneered by Budd for the railcar and truck bodies. This material develops a tensile strength of about 175,000 lb./sq. in. after cold working.

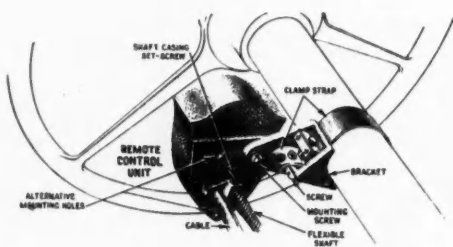
Table 1 condensed from a new data sheet just issued by the research laboratory of the U. S. Steel Corp., gives for the first time the properties of all grades of stainless steels in convenient form for the engineer.

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

Compact Reception

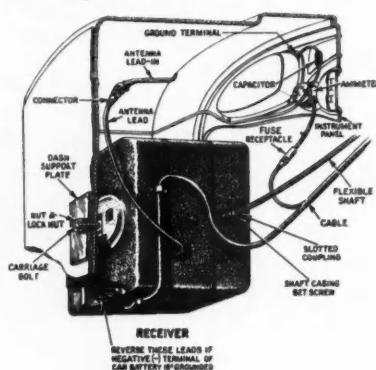
A new and unusually compact automobile radio receiver (selling for \$34.95) has been announced by the R. C. A. Victor Company, Camden, N. J. Chassis, eliminator and speaker



Victor automobile-type radio receiver

are in one self-contained unit which is mounted in the car by a single bolt through the dash. The vacuum tubes which were especially designed for the set, include the Pentagrid Converter and the Duo-Diode Pentode Radiotrons in a superheterodyne circuit, together with a new vibrator type of B eliminator using no tubes. The con-

trol unit, with the station selector and volume control, may be fastened to the right, left or front of the steering post with equal ease, or mounted on the instrument panel. The switch, lock and volume control have been combined, so that the switch key serves also to adjust volume.



Tone color control, good quality, automatic volume control and excellent selectivity and sensitivity are some of the features claimed for the new receiver. It measures only 8 3/4 in. high, 8 3/4 in. wide and 7 3/4 in. deep, so that the entire unit can be fitted into almost any convenient nook of the automobile.

Bearing With a Textile Base

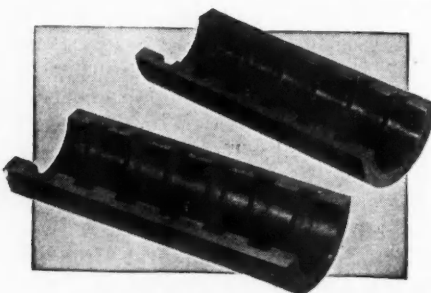
Gatke bearings, for a number of years made exclusively for steel mill service, are now available in a complete line for all general machinery uses, according to an announcement of the Gatke Corporation, 228 N. LaSalle St., Chicago, Ill. The requirements of rolling mill service for accuracy and resistance to tremendous pressure, wear, water, acids, heat, etc., have resulted in developments in construction that make Gatke bearings adaptable to all requirements.

Gatke non-metallic bearings are composed of a special textile base impregnated with synthetic resins, moulded under high pressures, and manufactured in all shapes and sizes. They are moulded of three basically different materials for various services, known as Gatke Hydrotex, Gatke Lubritex, and Gatke Graftex.

Gatke Hydrotex bearings are recommended wherever bearings run in water or where water is available for lubrication.

Gatke Lubritex bearings are designed for equipment that is oil lubricated.

Gatke Graftex is self-lubricating and especially made for slow moving machinery, where dirt and grit are



Gatke moulded non-metallic bearings

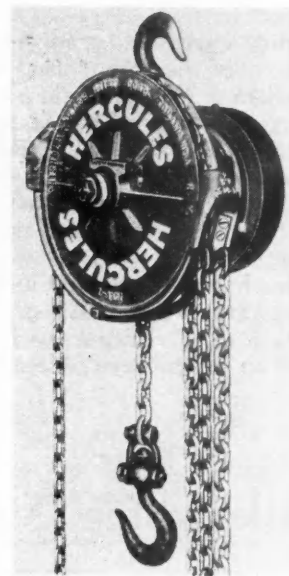
encountered or where lubrication is neglected.

The Gatke bearings will replace any bearing or bushing. They can be moulded to dimensions with inserts, if required. No machining is necessary. Characteristics do not change with age, and no deterioration occurs if machinery is idle or bearings are neglected for long periods. Accuracy and freedom from wear permit closer gauging of rolls, as in sheet steel and brass mills. They have a low coefficient of friction and are not affected by ordinary acids, chemicals, solvents, or salt water, or softened by oils or greases.

Hydrotex, Lubritex, and Graftex bearings are already furnished for journal diameters from 1/8 in. to 24 in. and can be made to still larger sizes. These materials have an extremely high tensile and shearing strength and a tremendous pressure resistance, although the weight is but one-seventh that of bronze bearings. They are adaptable to all service conditions.

Governor Protects High Speed Hoists

A high-speed hoist with a patented Safety Overload Governor is the recent addition to the CM line of hoists, manufactured by the Chisholm-Moore Hoist Corp., Tonawanda, New York. These new "Hercules" Hoists have the



Chisholm-Moore have new "Hercules" hoist

features of ordinary spur-gear hoists, plus improvements among which are: Rugged, simplified construction—efficient and economical operation on heavy-duty service—and the patented Safety Overload Governor which warns against dangerous, excessive overloads and protects hoist, load and operator against accidents.

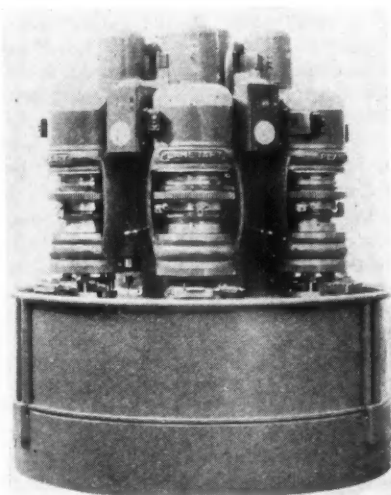
Another important feature is the Adjustable Load Brake, simple in design, yet positive in action. "Quick Lowering" (optional) in smaller capacities greatly speeds up handling in the production line.

"Hercules" Hoists are available in a wide range of capacities, from $\frac{1}{4}$ to 40 tons. Equipped with electric-welded "Inswell" Load Chain.

Mills 1200 Pieces per Hour

The latest production precision milling machine built by the Hall Planetary Co., Philadelphia, Pa., embodies a new machining principle called Continuous Planetary Milling. It is claimed that this machine has made possible a speeding up of production precision milling to a rate of 400-1200 pieces per hour, at the same time holding unusually close tolerances.

This machine performs many kinds of machining operations falling in the general class of thread milling and circular milling. In many cases



Hall continuous planetary miller

several operations are performed simultaneously. A partial list of automotive parts which may be handled on this machine is as follows:

- Differential carriers and housings
- Hubs
- Rear Axle Housings
- Shock absorber housings, caps, and reservoirs
- Bearings (all classes)
- Ball and roller bearings
- Pinion and gear blanks
- Threading (all classes)

The machine consists of six standard Planetary milling heads mounted vertically about a large central supporting casting. The entire machine and the six heads revolve continuously about a central column with six vertically running spindles Planemilling the work. A vertical motor

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

drives the entire machine through a large spur ring gear beneath the chip apron, while the milling spindles are driven by individual vertically mounted motors through a silent chain drive. Feed gear boxes run directly off a large diameter spur gear bolted to the stationary column. Two cam rings, bolted to the stationary central column, are sufficient to control the milling feeds of the six heads and likewise control the automatic operation of the six holding fixtures.

In no case is the machine stopped once it has been started. Provision has been made to replace cutters when dull by walking once around the machine while it is kept running, the whole operation taking only 20 seconds.

Individually motorized spindle drives to each head, independent milling feed controls, and individual fixture throw outs enable the operator to

throw the six units in and out of production as circumstances warrant. This enables as few as two heads to continue producing in event of temporary slowing up of production.

Provision is made to control the diameter milled in the work after cutters have been reground. This is done by using cutters in heads one to six consecutively and in between regrinding to specified sizes for each numbered head. This regrinding of the cutters to specified sizes eliminates shut down to set to size.

In locating the work with respect to the cutter, it has also been made unnecessary to stop the machine. A mild wedge actuated by a large graduated dial will allow adjustments as fine as .00025 in. while running to the location of each chucking fixture.

Floor space, 96 x 96 in.; height, 96 in.; weight, 30,000 lb.; main drive, 7 hp.

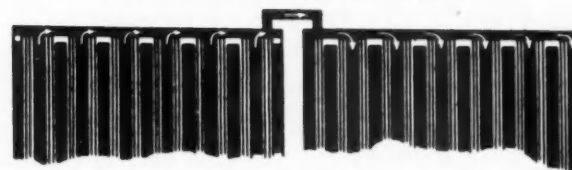
Posts Are Eliminated

U. S. Patent No. 1892962, covering a new method of cell connection for storage batteries, has been granted to the Patterson Manufacturing Company of Dennison, Ohio. This method

power-bar connection. Manufacturing costs are said to be materially reduced due to the elimination of posts, nuts and cell connectors, and the integral casting of the plate connecting strap and post and fusing it to the plates in one operation. Hand burning is limited to the short connector



CONVENTIONAL CONNECTOR



POWER-BAR CONNECTOR

Patterson storage battery connector

involves notching the inter-cell partition and burning a short cell connector strap across the partition. The connector is entirely concealed under the sealing compound.

Certain advantages are claimed for this construction, which is termed a

bar. It is claimed that under a heavy pull of 200 amperes or more the voltage drop is materially reduced and that approximately 10 per cent more starting power is made available than with the conventional system of connection.

S. A. E. Reveals Plans for Congress Program

**Eight-Day Meet to Be
Featured by More Than
20 Technical Sessions**

NEW YORK — Plans are taking shape rapidly for the eight-day International Automotive Engineering Congress which the S.A.E. is staging in Chicago beginning Aug. 28. The tentative program includes morning, afternoon and evening sessions on many days of the meeting, a banquet on Aug. 31 and a social evening on Sept. 2.

The Congress will start off with a military session Monday morning with Col. H. W. Alden presiding and with Major H. A. Nisley and Col. B. Taylor as speakers. Simultaneously there will be a machine shop session with K. T. Keller, chairman, and Joseph Geschelin, the speaker. Monday evening there will be a marine session.

Brake, production and legislative sessions are scheduled for Tuesday. M. C. Horine will be chairman and B. B. Bachman and David Beecroft the speakers at the brake meeting. A. J. Scaife will preside at the legislative session at which F. C. Horner will speak. F. W. Cederleaf will be the speaker at the production session.

U. S. C. C. Hears Dahl on Motor Regulation

**Insists Legislation Should Be
Based on Facts and Tests**

WASHINGTON — Presenting the motor industry viewpoint on motor vehicle regulation and taxation at the United States Chamber of Commerce round table conference on national transportation policies, T. R. Dahl, vice-president, the White Co., Cleveland, declared that the ultimate continuing use of motor trucks will be determined by the law of economics in the interest of the public. He made a plea to shippers not to hamper the workings of that law by ill-advised restrictions at their own expense.

Representative Rayburn, chairman of the House Committee on Interstate and Foreign Commerce, told the conference that legislation for the control of buses and trucks doing business in interstate commerce should be enacted. He gave no indication, however, that it would be enacted at the present session of Congress, and the general belief is that none will be passed.

"Facts are available based on actual traffic counts and on 10 years of physical tests made by government departments," Mr. Dahl pointed out. "Is there any justification for legislation not based on such facts and tests?"

May 6, 1933

Wednesday there is a transportation session with J. F. Winchester chairman and C. Brettell and L. V. Newton, speakers. On this day there will also be tractor and fuel sessions and a transportation luncheon at which J. M. Orr will speak. The chairman of the fuel session is T. B. Smith and the speakers include L. P. White and J. B. Macauley.

Diesel sessions will feature Thursday and there will also be a body session with R. F. Anderson, chairman, and N. H. Manning and F. A. Moss, speakers. D. D. Robertson will speak at the oil consumption session on Friday morning. W. T. Fishleigh is down for the passenger car session, which will also be held on this day. Friday will also have a session on lubricants as well as an evening meeting on passenger cars with J. M. Crawford, chairman, and C. F. Kettering and E. C. Elliott as speakers.

L. P. Kalb and W. Lewis will be chairmen respectively of Saturday morning passenger car and aircraft session. Alex Taub will speak at the former and J. C. Hunsaker and H. Foley at the latter. Sunday there will be an aircraft engine session with E. P. Warner in the chair and N. Rhode and J. A. Roche, speaking. On Monday there will be two aircraft sessions with L. D. Seymour, chairman of the evening meeting, and P. G. Johnson and J. Frye as speakers.

"Uniformity of dimensions and full reciprocity between states is essential to the public's full use of its investment in its highways.

"There can be no gain in conflict. There can be no progress in discriminatory legislation. There must be
(Turn to page 569, please)

Lyon Acquires Federal Tire Cover Patents

MILWAUKEE — The metal tire cover patent suits brought against the Federal Pressed Steel Co., by Lyon, Inc., and Lyon Cover Co., which are subsidiaries of Houdaille-Hershey Corp., have been settled, according to an announcement by President George F. Markham of the local company. As a result the Lyon interests have acquired all of the patents and patent applications pertaining to metal tire covers owned by Federal, as well as the cover department of Federal. The Milwaukee plant will continue to manufacture the covers for several months, when production will be moved to Detroit. Federal will continue the manufacture of automobile bumpers, railroad supplies and its other lines. An entirely new product is now in development which is expected to bring a substantial increase of general volume.

NE

April N.A.C.C. Output Largest Since July, '31

**Members Build 137,300
Indicating Industry's
Total Exceeds 170,000**

NEW YORK — The N.A.C.C. estimates that production of member companies in April totaled 137,700 cars and trucks, the largest total for the group since July, 1931, a span of 21 months. The April total represents a gain of 62 per cent over the March N.A.C.C. total of 85,000 and of three per cent over April last year, when the output figure was 133,034.

This estimate, of course, does not include Ford but it is estimated that his output for the month ranged between 40,000 and 42,000, which would place the industry total for April at between 172,000 and 177,000. These are the highest total figures reached since June, 1932. They indicate that the estimate of 165,000 made earlier this week and used in the leading article of this issue was too conservative.

On the basis of these estimates, production in the first four months of 1933 ranged from 540,000 to 545,000, a gain of two to three per cent over the 523,000 produced in the same period last year.

Maryland Registrations Drop

BALTIMORE — Registrations of new cars and trucks in Maryland amounted to 1,754 in April as compared with 2,095 in the same month last year.

Milwaukee Cadillac Adds Olds

MILWAUKEE — The Oldsmobile line is now being sold and serviced by the local branch of the Cadillac Motor Car Co.

Automotive Industries

WS

Tire Makers Up List Prices 5%

Sears and Ward Join in Action Which May End Long Price War

AKRON—The long downward slide of tire prices was checked this week when advances averaging five per cent were announced by Goodrich, Kelly-Springfield, United States, Firestone, Goodyear, Seiberling, Master, Mohawk, Dayton, Lee, Sears-Roebuck and Montgomery Ward. The present increases are the first advances in several years except for adjustments made in 1932 to cover the Federal tax.

The fact that the two large mail-order houses have joined in the movement indicates that something approaching a concerted effort is being made by the major factors in the tire industry to end the prolonged price war and to get on a more nearly rational basis. Additional support for this viewpoint is found in the announcement by Sears-Roebuck that it was closing out its third line of tires and after Aug. 31, 1933, would sell only two lines. This move brings one of the two large mail order houses in line with the policy adopted some weeks ago by all the important elements in the industry except Firestone.

At the new levels, prices still are lower than they were a year ago when rubber and cotton were about 30 per cent cheaper than now. Consequently further price advances are regarded as more than a probability, particularly if the two basic commodities continue to advance.

The new higher prices, of course, will help to blot out some of the red ink which has characterized the financial statements of many tire companies. In addition, the advances in rubber and cotton prices, amounting to about 40 per cent on the former material and to over 50 per cent on the latter since January of this year, gives them an inventory appreciation that will help to improve their earnings statements.

May Scheduled Output Exceeds 200,000 as Retail Sales Soar to New High Levels

Output and Domestic Sales in First Half of 1933 Now Expected to Exceed Last Year — Deliveries Show Further Gain of 20-25% in Last Week of April

by Athel D. Denham

Field Editor, Automotive Industries

DETROIT—Passenger car retail sales for the country took another 20 to 25 per cent jump in the closing week of April, raising total sales for April to a level regarded as an impossibility earlier in the month. As the result of this consistent increase in sales, week by week, automobile company executives now expect the improved sales level to be maintained in the immediate future.

This change in attitude has in turn resulted in a more liberal production policy and cars are being shipped to dealers on demand without any effort on the part of the factory to scale down dealers' orders in order to maintain a low level of new car stocks. In other words production is being geared directly to dealers' orders rather than directly to passenger car sales.

Nevertheless a number of companies experienced during April the unusual situation of having far underestimated market requirements and in a few cases retail sales for such companies actually exceeded production.

Automotive Industries survey this week of automotive plants indicates a scheduled production for May at the present time of roughly 201,700 as compared with 165,000 passenger cars and 28,000 trucks last year, in May. If this estimate is borne out it will make the third successive month this year when production has exceeded the corresponding month of 1932, with the percentage of increase rising each month. It is quite possible, if April's history repeats itself during May, that the above estimate

(Turn to page 568, please)

Rockelman Resigns Continental Post

DETROIT—Fred L. Rockelman, vice-president in charge of sales, Continental Automobile Company, has announced his resignation from Continental. Mr. Rockelman has made



Fred. L. Rockelman

no statements with regard to future plans. Announcement of the appointment of Mr. Rockelman's successor is expected in a few days. Previous to joining Continental Automobile Co., Mr. Rockelman was president of Plymouth Motors Corp. and before that sales manager of the Ford Motor Co.

Loranger on Leave

DETROIT—J. W. Loranger has taken a leave of absence from his position as sales manager for the Packard Motor Car Co. on account of ill health. He is succeeded by F. H. McKinney, who has been with Packard for 20 years, for the past ten years as advertising manager. Mr. McKinney will continue to direct advertising as well as sales.

Other appointments include J. A. Gilray as sales promotion manager, R. W. Carson as supervisor of districts, and H. W. Hitchcock as assistant advertising manager.

Cook County Gains 50 Per Cent Over March

CHICAGO—April registrations of new cars in Cook County totaled 4532 against 3031 in March and 4744 in April, 1932. General Motors lines accounted for 2081 of the total, Ford and Lincoln for 918 and the Chrysler divisions for 915, the total for the three being 3914, 86.3 per cent.

Auto-Lite Earns \$70,402

TOLEDO—First quarter earnings of Electric Auto-Lite Co. were \$70,402 after all charges and compared with net profit of \$547,680 in same period last year.

Exports, Imports and Reimports of the Automotive Industry For March and Three Months Ended March, 1933-1932

	Month of March		Three Months Ended March		Three Months Ended March	
	1933	1932	1933	1932	1933	1932
	Number	Value	Number	Value	Number	Value
Automobiles, parts and accessories.....		\$6,926,990		\$9,346,049		\$19,809,425
Motor trucks, buses and chassis (totals)....	2,529	1,122,740	3,183	1,373,075	8,748	3,558,511
Under one ton.....	250	63,287	245	61,666	804	199,402
One and up to 1½ tons.....	1,956	721,401	2,595	949,515	7,065	2,502,411
Over 1½ tons to 2½ tons.....	274	236,966	209	148,716	685	551,514
Over 2½ tons.....	42	96,296	124	297,428	134	232,932
PASSENGER CARS						
Passenger cars and chassis.....	5,528	2,614,914	5,541	3,192,614	18,108	8,594,693
Low price range \$850 inclusive.....	5,175	2,195,593	4,743	2,157,090	16,828	7,072,762
Medium price range over \$850 to \$1,200.....	214	209,760	377	375,086	728	708,338
\$1,200 to \$2,000.....	96	109,671	246	319,891	372	572,837
Over \$2,000.....	31	88,687	110	313,505	85	211,981
PARTS, etc						
Parts except engines and tires.....						
Automobile unit assemblies.....		1,659,289		2,693,350		3,650,051
Automobile parts for replacement (n.e.s.)....		934,886		1,265,260		2,552,105
Automobile accessories.....		100,025		205,025		292,141
Automobile service appliances.....		24,896		182,187		191,278
Airplanes, seaplanes, and other aircraft.....	30	543,123	12	192,624	126	1,638,510
Parts of airplanes, except engines and tires		194,822		68,646		403,874
INTERNAL COMBUSTION ENGINES						
Stationary and Portable						
Diesel and Semi-Diesel.....	3	12,566	3	3,087	4	18,006
Other stationary and portable.....						
Not over 10 hp.....	99	7,023	297	23,051	582	37,119
Over 10 hp.....	69	28,175	67	33,008	145	64,040
Automobile engines for:						
Motor trucks and buses.....	257	29,371	137	27,139	440	67,257
Passenger cars.....	2,483	164,069	2,749	255,546	4,550	322,080
Aircraft.....	29	151,826	41	159,765	637	387,476
Accessories and parts (carburetors).....		88,651		126,413		231,931
IMPORTS						
Automobile and chassis (dutiable).....	25	5,562	33	34,779	97	48,657
Other vehicles and parts for them (dutiable)		9,274		7,378		16,143

Commodity Divisions Not to Be Eliminated

WASHINGTON—Plans for reorganization of government departments indicate clearly that the automotive and other important commodity divisions of the Department of Commerce will be retained. This has been indicated by Secretary of Commerce Roper. It is understood that the staffs of the divisions may be trimmed and that a plan for consolidating them may be adopted, but the work now carried on by them as independent divisions will be continued. The original plan is said to have provided for abolition of the commodity divisions. Tremendous objections from industries of the country against cutting out the important work done by the automotive and other major divisions are reported to have brought about an alteration of the plans.

Thompson First Quarter

CLEVELAND—Thompson Products, Inc., has reported a net loss for the first three months of 1933 of \$72,996, after charges, as contrasted with a first quarter profit in 1932 of \$5,140.

Cerro de Pasco in Liquid Condition

NEW YORK—Cerro de Pasco Copper Company, in its balance sheet as of Dec. 31, 1932, shows current assets

of \$13,342,056, including \$5,422,533 in cash and marketable securities and current liabilities of \$557,010. At the end of 1931, current assets were \$16,725,078, including \$7,164,348 in cash and marketable securities, and current liabilities were \$969,130.

Bigger Terraplane Coming

DETROIT—Shipments of a new, longer Terraplane will begin not later than May 15, it is reported here. It is stated that the new car will be the longest and roomiest in the low-priced field and that it will be an addition to the line.

Automotive Industries Index of Motor Vehicle Production

	1933	1932
January	51	47
February	35	39
March	32	32
April	39*	36
May	46	
June	51	
July	36	
August	29	
September	29	
October	19	
November	32	
December	63	

*Preliminary.

Monthly average 1925-1932 = 100.

Bean Heads White Board Succeeding A. R. Erskine

CLEVELAND—A. G. Bean, president of the White Motor Co., has also been elected chairman of the board of directors, succeeding A. R. Erskine who became chairman of White following the acquisition of stock control by Studebaker last year. The directorate was reduced from 13 to 8, the following directors not being reelected: A. R. Erskine, H. D. Church, George F. Russell, George W. Smith, Jr., A. J. Chanter, K. B. Elliott and R. E. Lee. New directors elected were J. H. Watson, A. G. Rumpf and J. S. Condit. Paul G. Hoffman and H. S. Vance were reelected.

G.P.A. Glycerine to List at \$1.45 a Gal.

The list price next fall to the consumer on G.P.A. Radiator Glycerine will be \$1.45 per gallon, with larger margins of profit to both the jobber and the dealer, according to reports received by the Glycerine Producers' Association. This is the lowest price ever placed on this product.

Mullins Reports Loss

SALEM, OHIO—Mullins Mfg. Co. reports net loss after charges of \$126,469 for the first quarter of 1933, compared with net income of \$16,623 in the corresponding 1932 quarter.

Sixes and Eights Absorb Bigger Share of Market

New Passenger Car Registrations Classified by Number of Cylinders.

	First Quarter			
	Units		Per Cent of Total	
	1933	1932	1933	1932
Fours	6,553	45,798	2.90	17.50
Sixes	146,100	160,535	64.65	61.30
Eights	72,177	53,640	31.90	20.50
Twelves	1,144	1,526	0.51	0.58
Sixteens	83	330	0.04	0.12
Total	226,057	261,829	100.00	100.00

Half Billion in Gas Taxes Paid in 1932

\$47,941,483 Diverted To Non-Highway Uses

WASHINGTON, D. C.—State gasoline and motor fuel taxes and licenses for the sale of gasoline yielded a total revenue of more than \$514,000,000 in 1932 according to reports collected from State authorities by the U. S. Bureau of Public Roads. More than 14 billion gallons furnished power for motor vehicles. The tax was at an average rate of 3.6 cents per gallon. Consumption of gasoline declined 7.5 per cent from the previous year. Delaware and Maryland were the only States reporting increased consumption.

The total revenue was allocated as follows: to State highways, \$301,788,231; to local roads, \$94,073,954; to State and county road bond payments, \$50,726,362; to city streets, \$16,776,050; to costs of collection and administration, \$2,832,820; and to other than highway purposes, \$47,941,483.

Campbell, Wyant First Quarter

CHICAGO—A net loss of \$69,535 after depreciation, interest, etc., is reported for the first three months of 1933 by Campbell, Wyant & Cannon Foundry Co., compared with a net loss of \$24,379 in the first quarter of last year. Working capital at the end of the quarter was \$925,082 including \$612,127 cash and equivalent, against working capital of \$986,053 including cash of \$692,050 on Dec. 31, 1933. The current ratio on March 31 was in excess of 11 to 1.

German Ford Co. Loss

A net loss of rm. 6,037,000 for 1932 is reported by Ford Motor of Germany, controlled by Ford Motor of England, compared with a loss of rm. 1,696,000 in 1931. At par these losses are equivalent respectively to about \$1,440,000 and \$404,000.

Yellow Loss Larger

DETROIT—Yellow Truck & Coach Mfg. Co. reports a net loss of \$1,067,981 after charges for the quarter ended March 31, 1933 as compared with a loss of \$966,351 in the corresponding quarter last year. Sales in the quarter amounted to \$2,543,991 against \$4,040,500 in the first three months of 1932.

Motors Gain More than General List

NEW YORK—The market value of seven motor stocks included in a list of 100 diversified stocks, appreciated from \$614,059,000 at the end of March to \$1,112,034 at the end of April, an increase of 81.4 per cent, according to Frazier Jelke & Co. During the same period, the 100 stocks included showed an average appreciation of 45.5 per cent.

U.M.S. Distributing New Bearing Catalog

DETROIT—United Motors Service, Inc., distributors of New Departure ball bearings and Hyatt roller bearings has just issued a new service catalog which will be placed in the hands of some 2300 distributors in the U. S. and Canada. It contains replacement bearing data on all 1933 models, on cars, trucks, tractors and construction machinery, also marine equipment. The book is a supplement to the 1932 edition which gives the information for models from 1926 to 1932 inclusive.

Midland Cuts Loss

CLEVELAND — Midland Steel Products Co. reports net loss after depreciation of \$62,903 for the quarter ended March 31, 1933, as compared with a loss of \$139,135 in the 1932 first quarter.

Repossessions and Percentage of Cash Buyers Gain in 1932, NAFC Survey Shows

CHICAGO — Repossessions increased to 5.7 per 100 new cars financed in 1932 from 4.5 in 1931, while used car repossessions increased from 11.4 per 100 used cars in 1931 to 13.1, according to the accompanying tabulation of the National Association of Finance Companies.

An increase in the proportion of cash buyers is reflected by the figures showing a decrease in percentage of new cars financed from 62.8 in 1931

to 54.6 in 1932. The corresponding figures on used cars are 60.4 and 47.0. For new and used cars combined, the percentages financed were for 1931 and 1932 respectively, 61.3 and 48.6.

Some tendency toward longer terms and smaller down payments is revealed, also. The ratio between dealer sales of new and used cars continues to increase, being 185.9 for 1932 against 170.6 in 1931 and 128.6 in 1929.

Composite Experience of Finance Companies and Automobile Dealers				
Passenger cars	1929	1930	1931	1932
Average Direct Loss per Repossessed Car				
12 or less equal monthly payments.....	\$60	\$61	\$43	\$56
13 to 18 equal monthly payments.....	83	80	66	69
Percentage of Repossessions	Per Cent	Per Cent	Per Cent	Per Cent
New cars with down payment of 33.3 per cent	2.8	3.6	4.4	5.0
New cars with down payment of 25 per cent	5.1	4.6	5.8	6.8
All new cars.....	...	...	4.5	5.7
Used cars with down payment of 40 per cent	5.3	6.5	7.0	10.4
Used cars with less down payment.....	9.0	9.8	14.6	15.0
All used cars.....	...	...	11.4	13.1
Average Amount of Note Purchased				
New cars, including some commercial...	\$595	\$567	\$554	\$546
Used cars, including some commercial...	296	279	268	241
Percentage Sold on Installments	Per Cent	Per Cent	Per Cent	Per Cent
New cars	62.6	62.3	62.8	54.6
Used cars	65.1	64.8	60.4	47.0
All cars	64.0	63.8	61.3	48.6
Percentage of Trade-Ins, Sales, etc.				
Trade-ins on sales of new cars.....	72.5	75.1	80.2	88.7
Trade-ins on sales of used cars.....	45.5	49.1	46.7	47.7
Total trade-ins, per cent of new cars sold	127.1	155.5	160.0	175.6
Used cars sold, per cent of new cars sold	128.6	164.0	170.6	185.9
Used cars junked, per cent of all trade-ins	9.2	14.3	13.5	14.3
Installment Paper Ratios				
Paper with more than 12 mo. payments..	14.9	16.6	17.8	21.9
Paper with less than std. down pay't...	8.0	11.8	11.1	13.7
New car paper to total paper bought....	70.0	63.4	60.1	56.6
Used car paper to total paper bought....	30.0	36.6	39.9	43.4
Number new cars to total financed.....	54.0	46.2	42.1	36.5
Number used cars to total financed.....	46.0	53.8	57.9	63.5
Used Car Paper				
Per cent with recourse.....	66.3	68.5	61.8	62.3
Companies taking all with recourse.....	38.0	38.3	29.8	29.1
Companies taking part with recourse....	56.2	52.4	54.4	60.8
Companies taking all or part recourse...	94.1	90.7	84.2	89.9
Per Cent above Red Book appr. value...	29.3	38.9	39.2	32.0

Mack Loss \$366,908

NEW YORK—Mack Trucks, Inc., reports for the quarter ended March 31, 1933, a net loss of \$366,908 after depreciation. This compares with a net loss of \$313,071 for the corresponding quarter ending March 31, 1932. First quarter sales volume was one-third less than in 1932.

E. G. Budd Co. Cuts Loss

PHILADELPHIA—Net loss after charges of the Edward G. Budd Mfg. Co. for the quarter ended March 31, amounted to \$397,488 against \$541,346 in the corresponding 1932 quarter.

Marlin-Rockwell Statement

NEW YORK — Marlin-Rockwell Corp. reports net loss after charges of \$53,796 for the quarter ended March 31.

May Output

(Continued from page 565)

may prove conservative. Among the companies which are expected to definitely exceed their April production during May are Dodge, Hudson, Chevrolet, Ford, Oldsmobile, Packard, Hupmobile, Studebaker, Graham and Reo. It is also quite likely that Plymouth's 24,534 and Pontiac's 8100 April production for instance will be exceeded by a considerable margin in May.

Indicative of what has been occurring generally are the following individual reports:

Chevrolet April production was 59,953 cars and trucks compared with 55,433 for April of last year. Shipments to dealers were approximately 55,000 during the month. W. S. Knudsen expressed the belief that the season may be continued beyond the normal peak and that the second quarter should be ahead of the corresponding period of last year.

Plymouth April production was 11.5 per cent over April of last year. May schedules exceed 26,000 of which approximately 30 per cent are on the Standard line. DeSoto dealers retail sales for the week ending April 29, were 1760, representing an increase of 25 per cent over the preceding week for the combined Plymouth and DeSoto lines.

Hupmobile April shipments were 48 per cent ahead of March, with retail deliveries 53 per cent of March and greater than any month since last June. May schedules call for better than 50 per cent increase in production, based on dealers' orders.

Hudson reports April sales as 34.4 per cent ahead of April, 1932. The last week of April showed a gain of 25 per cent over the preceding week, with indications that the first week in May will show a further increase. Last three weeks of April showed an increase of 82 per cent over the pre-

ceding three weeks. April sales were in excess of production with a shortage of cars at several points.

Unless there is a sharp reversal in new car sales during the latter part of May or in June it appears probable that domestic new car sales as well as production for the first six months of 1933 will be well ahead of totals for the first six months of 1932 when roughly 455,000 passenger cars were built and 415,000 sold.

New car registrations this year, dealer reports of retail deliveries indicate, are a poor guide as to new car sales, month by month in many states, a factor which will make actual sales to owners during April a difficult matter to compute. It is quite evident, however, that sales in that month exceeded the 120,000 figure estimated a few weeks ago by a comfortable margin.

Michigan, which has been lagging behind the rest of the country in automobile sales for the months of February and March, showed a decided jump during April, with indications that new car registrations may well exceed figures for April last year. Wayne County normally representing 50 per cent of the state's registrations shows a total of 3165 new car registrations as against 2557 last April. Much of this was due to the sudden spurt during the last week with over 1000 cars sold in Detroit alone.

Overland in Canada Virtually Shut Down

TORONTO — The situation with regard to Willys-Overland Limited, Toronto, is clouded in uncertainty, according to available information which is rather meager. The receivership of the Willys-Overland Co. in the United States did not affect the Canadian company directly and at once because the Toronto enterprise is entirely separate. At the same time, the Canadian plant has been unable to procure cylinder blocks, rear axles and other parts from Toledo except on a cash-down basis—the ruling of the receivers being that cash in full must accompany any order. Incidentally, paying in cash has necessitated the addition of from 12 to 20 per cent to the Canadian dollar in order to meet the premium on U. S. funds.

Apart from the financial position, developments with the "parent" company of Toledo have brought a virtual shut-down in the Canadian plant, largely because of the uncertainty of the future. The staff at Canadian factory headquarters is being reduced to a skeleton and there are no men on the road, it is said, while the service department personnel has been cut down to a minimum. This has been done, it is understood, because no one appears to know what is going to happen next in the affairs of the U. S. company.

Varzi in Bugatti Eight Wins Monaco Grand Prix

PARIS (by mail)—Achille Varzi, driving a straight eight supercharged Bugatti, won the fifth Monaco Grand Prix, consisting of 100 two-mile laps of a circuit laid out through Monaco and Monte Carlo, at an average of 57.04 miles, this constituting a record. Varzi competed against Nuvolari, on an Alfa Romeo, for two hundred miles, first one car then the other having the lead but never for a greater distance than three lengths. Finally on the last lap, with only a mile and a half to go, Varzi passed Nuvolari when an oil pipe broke on the Alfa Romeo. Nuvolari pushed his car over the line, but as he did not finish within three minutes of the winner, he was not placed. Borzacchini on Alfa Romeo was second, Dreyfus on Bugatti third and Louis Chiron on Alfa Romeo fourth. There were 18 starters.

Auburn April Shipments Exceed Last Year Totals

AUBURN, IND.—Auburn Automobile Co. shipped 1138 cars in April of this year as compared with 1124 in April, 1932, according to President W. H. Beal.

"April of this year was the best month since June, 1932," Mr. Beal said. "Also, we have more unfilled orders on hand now than at any time since June, 1932. Our outlook for May is so bright that we expect to more than double the number of shipments made during May last year."

"As a result of this increase in sales, we have reemployed many workers in our factories here and in Connersville, Indiana. Some departments have been working overtime."

Diamond T Has Best Month in Three Years

CHICAGO, May 2—(Special)—April sales of The Diamond T Motor Car Co. showed an increase of 41 per cent over the same period of last year and were higher than any month since 1930, according to E. J. Bush, sales manager. First quarter sales also were 41 per cent ahead of last year.

Hudson First Quarter Loss Was \$1,491,005

DETROIT—Hudson Motor Car Co. reports for the first three months of 1933 net loss of \$1,491,005 after charges and provision for possible loss on cash held in closed or restricted banks. This compares with a net loss of \$1,245,943 in the same period of 1932.

Special Session Unlikely to Act on Alcohol Mixing

WASHINGTON — Legislation on the bill for the blending of alcohol with gasoline, favored by Agriculture Secretary Wallace and thus presumably by the administration, has been definitely postponed for this session of Congress.

This was announced yesterday by Chairman Pat Harrison of the Senate Committee on Finance following an executive session of the committee. Senator Harrison said that he will confer with the House Committee on Ways and Means in an effort to have a Joint Congressional Committee, consisting of the Senate and House Committee, to study the question and report at the regular session of Congress. The sudden turn in the plans to push the legislation through at this session came as a surprise. It came in the midst of arrangements to proceed with hearings. Protests from oil producers and others are said to have brought about the plan indefinitely to postpone action on the legislation. It is expected that action, whether favorable or unfavorable to the legislation, will be determined at the regular session.

Canadian G. M. Prices Up to Cover New Taxes

TORONTO—Slight changes have been made in the prices of all models of General Motors of Canada Limited because of recent tax and tariff amendments by the Dominion Government. One levy has been the tax of two cents per lb. on tire casings and three cents per lb. on tubes, this being required whether the tires are factory equipment or replacements.

As a result, price increases on the Chevrolet range from \$6 to \$12 per car, according to the model. Increases on the Pontiac and Oldsmobile scale up to \$13, while prices of the Buicks have increased as much as \$35.

U. S. C. C. Hears Dahl

(Continued from page 564)

coordination of purpose and earnest analysis of facts if transportation in all its divisions is adequately and economically to serve the American public.

"The public interest in transportation must be protected and preserved," said Mr. Dahl. "Attacks are made on the service being rendered to shippers under the guise of regulating motor transportation before the legislatures in practically every state in the union. This is a direct attack on the public purse.

"The regulating of the business of contract carrier trucks should not be

lightly subscribed to. It is the little fellow's transportation medium on the highways. Such legislation must of necessity interfere with the flexibility of this service, which is its greatest benefit to the shipper.

"Theoretically, the common carrier motor truck should be regulated as it more nearly approaches the common carrier characteristics of the motor bus, but practically such regulation is unenforceable and would be unbelievably expensive."

Studebaker Exports Showing Big Gains

SOUTH BEND—April exports of Studebaker, Rockne and Pierce-Arrow passenger cars were the largest for any month since March, 1930, and truck exports were the largest since September, 1931, according to Arvid L. Frank, vice-president and general manager of The Studebaker Pierce-Arrow Export Corp. April car exports were 25 per cent ahead of April, 1932. Truck exports to date are 41 per cent ahead of the same four-month period of 1932.

Plymouth Handles Own Distribution

DETROIT—Distribution of Plymouth cars is now being handled directly by Plymouth Motors Corp. instead of through the sales organizations of the Chrysler Corp. divisions. This move is largely intended to expedite the handling of orders in Plymouth cars which have to some extent become more complicated through the introduction of two Plymouth models instead of one formerly produced.

Link-Belt Quarterly Report

CHICAGO—Link-Belt Co. reports a net loss of \$205,672 after charges for the first quarter of 1933 as compared with a loss of \$174,809 in the same period in 1932.

Budd Wheel Reports

PHILADELPHIA—Budd Wheel Co. sustained a net loss after charges of \$303,467 in the quarter ended March 31, 1933, as compared with a loss of \$450,166 in the same period in 1932.

Borg-Warner Quarterly Report

CHICAGO—Borg-Warner Corp. reports net loss after taxes and other charges of \$381,981 for the quarter ended March 31, 1933, as compared with a net loss of \$170,220 last year.

Steel Prices Move to Higher Levels

But Consumers Are Buying Only for Immediate Needs

NEW YORK—For the first time in several years buyers faced this week a genuinely rising tendency in the steel market. Following an announcement of a \$2 per ton advance in hot-rolled strip prices by Pittsburgh district mills, the leading Western "independent" promulgated price increases of \$2 per ton on hot-rolled sheets and \$3 a ton on full cold-rolled sheets. An advance of \$3 per ton in cold-rolled strip is impending.

All of these upward price changes come under the head of adjustments of values that had crumbled under the prolonged lack of demand. None can be interpreted as denoting anything like anticipation of a general inflationary movement in commodity prices generally. Somewhat more in the latter category is a sharp advance in ferroalloys prices which, in turn, imparts to the market for automotive alloy steels a much stronger undertone that before long may have to be translated into higher levels for these.

Automotive demand has been chiefly responsible for a further rise in the steel industry's operating rate, now estimated to absorb close to 30 per cent of the theoretical ingot capacity, with the rate at which finishing mills are operating in the districts with heaviest automotive demand ranging from 40 to close to 50 per cent.

Market observers ascribe the improved pace to seasonal influences and to the natural reaction following prolonged lethargy and emphasize as a matter of record that betterment was fully established before any of the proposed remedial measures of a fiscal character had matured. Aside from some protective contracting by jobbers for future deliveries, buying consists, as it has for some time, of immediate requirements.

Pig Iron—Quite a few consumers have been spurred by talk of higher prices to provide for their needs over the remainder of this quarter and to sound the market for third quarter prices. While nominally unchanged, prices rule much firmer.

Aluminum—Automotive demand has turned much more active. Tighter conditions prevail in the secondary market with remelters seeking to safeguard themselves in accepting orders for future deliveries against contraction in the supply of scrap.

Copper—Early this week only a negligible tonnage of copper was offered at 6½¢ and the market was more generally appraised on a 6¼¢, delivered Connecticut point, basis.

Tin—Prices have gone up by leaps and bounds, largely under the influence of the advance in Sterling exchange. Consuming demand turned active as prices rose. The week's opening quotation for prompt Straits was 32½¢.

Lead—Demand has turned sufficiently active to justify in the opinion of producers further upward price revisions.

Zinc—Steady at 3¼¢, East St. Louis.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

General business activity continued to advance last week. The improvement included most lines of trade; and, while it was not accompanied by the rampant speculation of the preceding week, the gains were substantial and more than seasonal. A more cautious attitude on the part of traders and investors had the effect of lowering the prices of speculative commodities. The dollar in foreign exchange markets was steadier.

Freight Loadings Low

Railway freight loadings during the week ended April 22 totaled 492,970 cars, which marks a decrease of 1,245 cars below those during the preceding week, a decrease of 69,557 cars below those a year ago and a decrease of 265,533 cars below those two years ago.

Employment Drops

The index of employment in manufacturing industries, compiled by the Department of Labor, for March stood at 55.1, as against 57.5 for February and 64.5 a year ago. The index of payrolls stood at 33.4, as against 36.4 for February and 48.2 a year ago.

Power Production

Production of electricity by the electric light and power industry in the United States during the week ended April 22 was 2.6 per cent below that a year ago. This marks the smallest decrease since September, 1931.

Crude Oil Output

Average daily crude oil production in the United States for the week ended April 22 amounted to 1,795,500 barrels, as against 1,934,000 barrels for the preceding week and 2,267,900 barrels for a year ago.

Bituminous Coal Steady

Production of bituminous coal during the week ended April 15 totaled 4,850,000 tons, as against 4,755,000 tons during the preceding week and 4,950,000 tons a year ago. Anthracite production amounted to 717,000 tons, as against 874,000 tons during the preceding week and 1,322,000 tons a year ago.

Fisher's Index

Professor Fisher's index of wholesale commodity prices for the week ended April 29 stood at 58.6, the highest since the week ended December 17, 1932, as against 57.1 the week before and 56.8 two weeks before.

Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended April 26 showed decreases of \$29,000,000 in holdings of discounted bills and of \$31,000,000 in holdings of bills bought in the open market. Holdings of Government securities remained unchanged. The reserve ratio on April 26 was 62.7 per cent, as against 61.5 per cent a week earlier and 60.6 per cent two weeks earlier.

M.E.W.A. Backs M.E.M.A. Show

CHICAGO, April 25.—The Motor and Equipment Wholesalers Association will give this year's national automotive exposition of the Motor and Equipment Manufacturers Association "its complete support and cooperation in every way possible in providing for the industry a trade exhibition that will do justice to the interests of the entire trade."

Announcement to that effect is contained in a communication to M.E.W.A. members sent out over the signature of B. W. Ruark, General Manager.

"This association and the M.E.M.A., together with its predecessor, have consistently stood for one representative trade show for our industry. That is still the position of the M.E.W.A." Mr. Ruark states.

This year's exposition is scheduled to be held here at the Merchandise Mart from October 23rd to 28th.

Packard Exports Gain

DETROIT—D. C. Budd, general manager of the export division of Packard Motor Car Co., has reported that export business for the first quarter this year exceeded that of the first quarter last year by 26 per cent.

Receivers Appointed for Marmon Company

Reorganization Plans Under Way—Marmon-Herrington Co. Not Affected by Receivership

INDIANAPOLIS — Receivers were named on Monday of this week for the Marmon Motor Car Co. in superior court here. The suit asking a receiver was filed by the Eaton Spring and Axle Company on an account of \$1,100. Ferd Barnickel, president of the Indianapolis Drop Forging Company, and Robert A. Adams, attorney, were named receivers for the Marmon Company. Walter C. Marmon, chairman of the board for the Marmon-Herrington Company, Inc., truck manufacturers, explained that this action does not affect the truck firm in any way as the two firms have been completely independent for more than a year.

The appointment of the Marmon receiver follows several months of reorganization seeking to conserve the assets of the company. G. M. Williams, president of the Marmon Motor Car Co., said that the national bank holiday caught the company at a critical time and that production could not be brought to profitably high levels. Williams added that work already has started to attempt a plan whereby the business may be kept alive after the release from receivership.

Auditors have been at work on Marmon books for some time and as yet no report has been made.

Gasoline Consumption Declines 5.4 Per Cent

NEW YORK — Gasoline consumption in the first two months of 1933 amounted to 2,001,855,000 gal. as compared with 2,150,934,000 gal. in the same months last year, a decrease of 5.4 per cent. In February, consumption totaled 953,422,000 gal. against 1,054,267,000 in February, 1932.

Increases were shown over the first two months of 1932 only in the District of Columbia, Iowa, Kansas, Maine, Nebraska, North Dakota and Oregon. In none of these political divisions does the gasoline tax exceed four cents per gal.

G.M. Continues 25c Common Dividends

NEW YORK—General Motors has declared on the outstanding common stock a quarterly dividend of 25c. a share, payable June 12, 1933, to stockholders of record May 11, 1933. In addition the regular quarterly dividend of \$1.25 a share was declared on the \$5 Preferred Stock, payable August 1, 1933, to stockholders of record July 10, 1933.

April White Volume Up 50% from March

CLEVELAND—An order for 22 White heavy-duty trucks, valued at approximately \$100,000 for the chassis above, from the Kroger Grocery & Baking Company, of Cincinnati, has been received by the White Motor Co. These units will be equipped with a drop-frame trailer of special design.

In addition to this large order the White Company also received an order for five Indiana and five Studebaker trucks from the Fidelio Brewing Company, of New York City, one of the oldest brewing establishments in the country. In the past few weeks the company has received orders for more than 65 trucks for the hauling of beer.

"We are encouraged with the apparent betterment in general business conditions," President Bean said. "White district and branch offices showed a 22 per cent gain during the

first quarter of this year as compared with 1932, and our April business is 50 per cent better than in March."

Eaton First Quarter Loss

CLEVELAND.—Eaton Mfg. Co., including subsidiaries as well as the Wilcox-Rich Corp., reports net loss for the first three months of 1933 of \$207,429 against a profit of \$57,723 in the corresponding quarter a year ago. The loss reported is after depreciation, taxes, etc., but before Wilcox-Rich class A dividends.

Prosser Takes on Krause

NEW YORK.—Thomas Prosser & Son, American distributors of Widia brand cemented carbide tools, announce that they have taken on the distribution of the Krause precision boring machine which was described in *Automotive Industries*, April 15.

Hinchcliffe New Graham Distributor in Boston

BOSTON—The Hinchcliffe Motor Co. has been appointed Graham Paige distributor for eastern Massachusetts and Connecticut. F. A. Hinchcliffe, its president, is one of the pioneers in New England starting with Winton 30 years ago. He is secretary-treasurer of the Boston Automobile Dealers Association. The company was New England distributor for Auburn several years. Graham Paige has been operated as branch in Boston for a decade.

Delco Products Expands Output

DAYTON—Delco Products Corp. has increased production to 80 per cent of capacity compared with 50 per cent a month ago. The number of employees has been increased to 3000 against 2400 a month ago and 3500 a year ago.

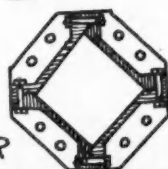
Automotive Oddities—By Pete Keenan

Write us if you know an Oddity



THOMAS WILL

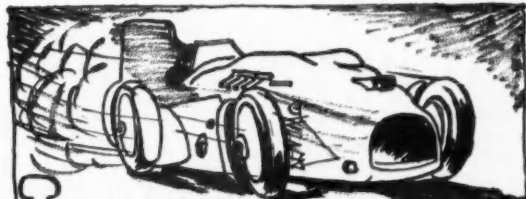
THE OLDEST DRIVER IN THE WORLD 103 YEARS OLD. ALWAYS DRIVES IN SECOND GEAR AND NEVER EXCEEDS 12 MILES AN HOUR. *Mancelona-Mich*



INVENTOR
DESIGNS METHOD OF BUILDING ENGINES WITH SQUARE SHAPED CYLINDERS AND PISTONS. CLAIMS IMPROVED PERFORMANCE AND SIMPLER CONSTRUCTION.



TURPENTINE AND RUBBER ARE MADE OF THE SAME ELEMENTS IN THE SAME PROPORTION.



THE BLUE BIRD USED A GALLON OF GAS EVERY QUARTER OF A MILE ON ITS RECORD RUN.

Daytona Beach 1933.



FOKKER

DESIGNER OF GERMAN PLANES IS NOT A GERMAN. He was born in Java.

Studebaker Shipments Pass 250 Daily Mark

Five Days Ending April 25 Best Since June, 1932

SOUTH BEND—With the exception of the period early in the year when new models were distributed to dealers, the number of cars shipped by Studebaker during the five day period ending April 25 was higher than in any other five day shipping period since June 20, 1932, Paul G. Hoffman, president of The Studebaker Sales Corporation of America, reported today.

Shipments during this April period exceeded thirteen hundred cars and were 15.2 per cent greater than those of the next greatest five day shipping period, Mr. Hoffman said.

He also announced that, since March 21, scores of representative distributors and dealers in all sections of the country have been signing Studebaker and Rockne franchises. Among others, the following new retail outlets have been established in strategic markets: Arthur R. Lindburg Co., San Francisco, Cal.; Pasquini Motor Co., Wilkes-Barre, Pa.; Adt. Motor Company, Kansas City, Kansas; Piedmont Motor Corp., Winston-Salem, N. C.; Robt. Y. Burns, Erie, Pa.; Phil Payne Motor Co., Lynchburg, Va.; Graulich Auto Sales Co., Evansville, Ind.; Wilcox & Malm, Grand Forks, N. D.; Meridian Garage, Yankton, S. D.; J. S. Terman, Mansfield, Ohio; John R. Mattson, Inc., Brookline, Mass., and Slater Motor Sales Inc., Greenwich, Conn.

Milwaukee Pump and Tank Works Formed

MILWAUKEE—Milwaukee Pump & Tank Works, Inc., has been organized by Charles D. Ashley and associates to take over the assets and continue the business of the Milwaukee Tank Works, Inc., manufacturer of tanks, pumps and other filling station and garage equipment, in receivership. The property was bought at trustee's sale for \$121,000, the amount of two mortgages.

New Two-Stroke Engine

WASHINGTON, D. C.—A new two-stroke aircraft engine is reported to have passed its tests in England and may appear on the market shortly. It is said to be a four-cylinder in-line engine and to develop 180 hp. at 4500 r.p.m., for a weight of only 185 lb. A 3-to-1 gear reduction is used. The uniflow principle is employed, air and combustible mixture entering the cylinders at the top and the burnt gases being discharged at the bottom. There are two valves admitting pure air from a compressor to the cylinder at the top, producing a supercharging effect.

These are actuated by a half-time shaft and operate alternately. In addition there is a valve through which an over-rich mixture is admitted, this valve opening at about the time the exhaust ports at the bottom end of the cylinders close. It is claimed that by admitting an over-rich mixture and a charge of air separately, a very high compression ratio can be used.

Part with Weidenhoff

CHICAGO—B. M. Ikert has joined Joseph Weidenhoff, Inc., as technical editor and will devote his efforts to trade and other educational activities. Mr. Ikert was at one time technical editor of *Motor Age*, now merged with *AUTOMOBILE TRADE JOURNAL*, and most recently was managing editor of *Motor Maintenance*, which has been discontinued.

Bendix Reports Loss

CHICAGO—Bendix Aviation sustained a net loss of \$267,463 in the first quarter of 1933 contrasted with a net profit of \$26,364 in the same quarter last year.

Hill With Hexcel

The Hexcel Radiator Company announces that V. O. Hill has been appointed general sales manager.

CALENDAR OF COMING EVENTS

CONVENTIONS

National Association of Cost Accountants Convention, Waldorf-Astoria Hotel, New York.....June 12-15

MEETINGS

Natl. Automobile Chamber of Commerce, Annual, New York City, June 8
Natl. Retail Hardware Assoc., Indianapolis.....June 12-16
A.S.M.E. Natl. Aeronautic Meeting, Chicago.....June 26-27
American Society for Testing Materials, Chicago.....June 26-30
Automotive Engine Builders Assoc., Annual, Chicago.....July 10-14
International Automotive Engineering Congress of the S.A.E., Chicago, Aug. 28-Sept. 4
American Chemical Society, Chicago, Sept. 11-15
American Transit Assoc., Chicago, Sept. 18-20
Natl. Safety Council, Chicago.....Oct. 2-6
National Metal Congress, Detroit, Oct. 2-6
American Petroleum Institute, Annual, Chicago.....Oct. 24-26

SECTION MEETINGS—S. A. E.

Baltimore.....May 18
Canadian.....May 17
Cleveland.....May 18
Metropolitan.....May 18
New England.....May 10
Northern California.....May 9
Philadelphia.....May 10
Pittsburgh.....May 11
Southern California.....May 19
Washington.....May 17

RACES

Indianapolis Race.....May 30

British Parts to Get Free Canadian Entry

Dominion Adopts Amendment Lifting 20 Per Cent Tariff

TORONTO—Duty-free entry of "parts of motor cars and motorcycles" manufactured in the United Kingdom, is provided by the adoption of an amendment to the Customs tariff by the Canadian Parliament. In one sweep, entirely to the advantage of the allied industries in Great Britain, this means a reduction of 20 per cent in the cost of motor car and motorcycle parts to the consumer in the Dominion. Just what will be listed as free of duty as a result of this comprehensive change has not yet been officially divulged.

The intention of the unexpected amendment is to encourage the assembly of British motor vehicles in Canada, either in factories already established or in assembly plants to be created. There has been some talk of cooperative warehouses in the Dominion for British motor vehicle manufacturers and if there was ever a legislative provision to encourage this development this is it. A manufacturer or distributor can now import parts from Britain entirely free of duty and proceed with the assembly of the complete unit in Canada.

The development also means much to the motorcycle trade in Canada. During this season practically two-thirds of all motorcycles sold in Canada will be of British manufacture. Incidentally, less than five years ago, the situation was entirely reversed with approximately two-thirds of all sales being of motorcycles imported from the United States.

Nagler With Allis-Chalmers

MILWAUKEE—Forrest Nagler, mechanical engineer, formerly a staff executive of the A. O. Smith Corp., has become associated with the Allis-Chalmers Mfg. Co., also of Milwaukee, as representative with headquarters at Toronto, Ont.

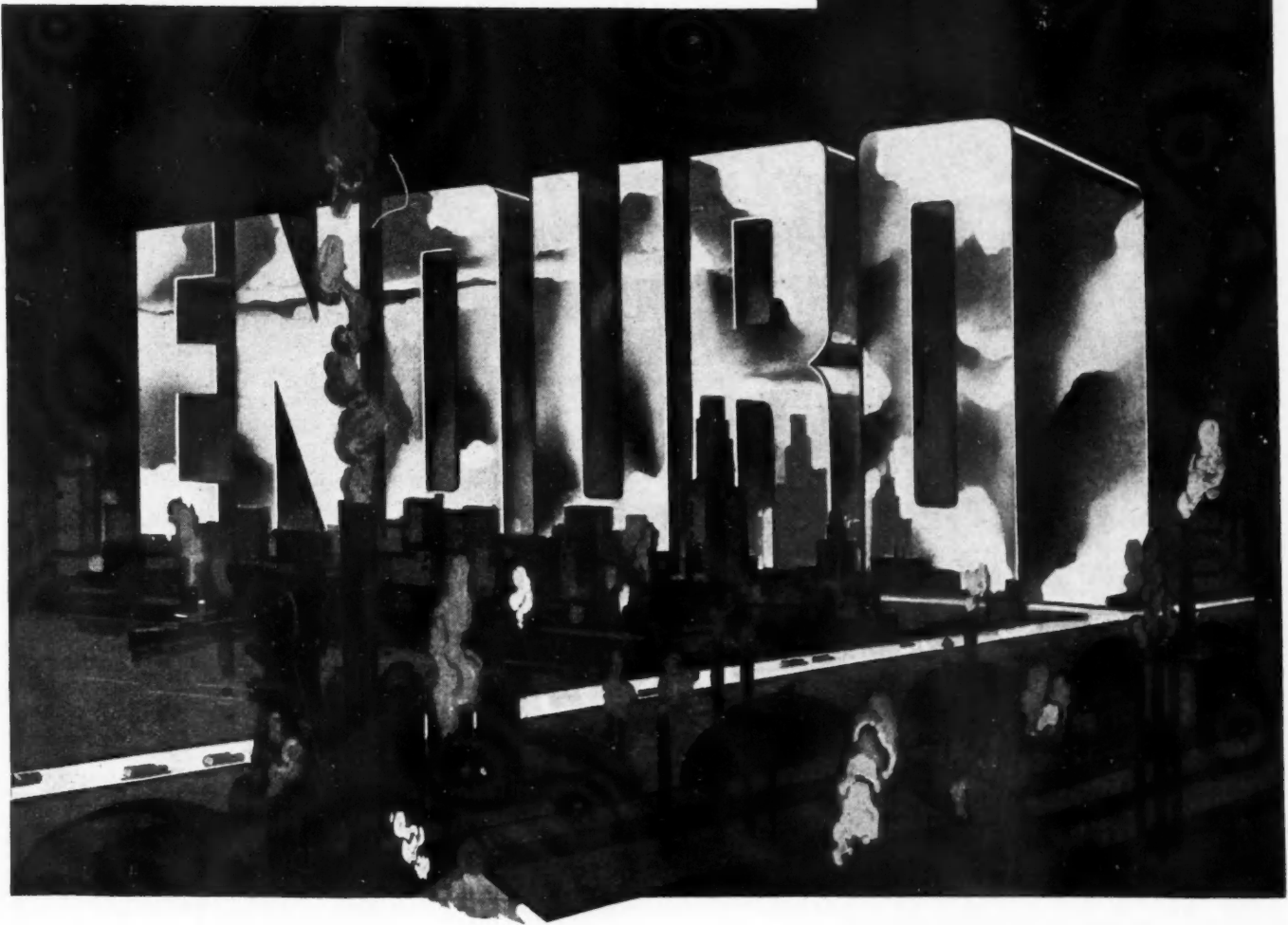
Brady in Turin

DETROIT—Lloyd D. Brady, formerly in charge of Ford Motor foundries, River Rouge, has been commissioned by F-I-A-T, Turin, Italy, where Mr. Brady now is, to inject American methods and devices into their already very modern foundry departments.

Packard Appoints Bellows

DETROIT—W. R. Bellows, formerly manager of the Brooklyn branch of the Packard Motor Car Co. of New York, has been appointed general manager of the Packard Motor Car Co. of Chicago, succeeding K. C. Wettstone, resigned.

CORROSION AND HEAT MEET THEIR MATCH IN ENDURO



There are many places in industry where high temperatures and corrosion make the use of all ordinary metals uneconomical. Such conditions meet their match in ENDURO, Republic's Perfected Stainless Steel.

To meet the demand for corrosion and heat-resisting alloys for a wide variety of specific purposes, ENDURO has been developed in a number of types. The result is a series of low-carbon stainless alloys with chromium content ranging from 4% to 30% and with or without other alloy additions of nickel, molybdenum, tungsten and other elements. This makes it possible to select the right type to combat atmospheric rusting, solution by acids and other chemical compounds, and scaling at temperatures up to 2400 degrees F.

Write for detailed descriptive literature.

CENTRAL ALLOY DIVISION . . . MASSILLON, OHIO
REPUBLIC STEEL CORPORATION
 GENERAL OFFICES  YOUNGSTOWN, OHIO

*Licensed under Chemical
 Foundation Patents Nos.
 1316817 and 1339378.*

ENDURO
 REPUBLIC'S PERFECTED
 STAINLESS STEEL

ENDURO

IS AVAILABLE IN MANY FORMS

Sheets, in all plain and polished finishes and in an unusually wide range of sizes. Standard gauges.

Plates, in practically any size and thickness obtainable in plain steel; large size one-piece flanged and dished heads.

Strip, hot rolled, cold rolled and polished.

Rounds, hot rolled, cold drawn, centerless ground and polished.

Squares, hot rolled and cold drawn.

Hexagons, hot rolled and cold drawn.

Flats, hot rolled and cold drawn.

Forging blanks, any reasonable weight or size.

Shapes, angles, channels, I-beams, etc. Sizes on application.

Tubing, both seamless and electric weld. Pickled or polished.

Welding rods, $\frac{1}{8}$ in., $\frac{1}{4}$ in., $\frac{3}{8}$ in. diameter. Coated and uncoated carried in stock for electric and acetylene welding.

Castings, furnished of ENDURO analysis by special arrangement.

Bolts and nuts, rivets, screws, wire and many other items can be obtained of ENDURO from various sources.

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Speaking of Safety
GET THIS!

SAFETY CODE
(22 STATES)
REQUIRES A STOP IN
40 FT.
AT 20 MILES PER HOUR

STEWART-WARNER
Automatic
FULL POWER BRAKES
CAN STOP SAFELY
IN **14 FEET**
AT 20 MILES PER HOUR

See the
STEWART
WARNER
EXHIBIT
1933
A CENTURY
OF PROGRESS

Stewart-Warner Automatic "Full Power" Brakes provide almost three times the margin of braking safety demanded by most safety codes.

STEWART-WARNER

May 6, 1933

Automotive Industries

no more — no less

tell why Stewart-Warner
Automatic "FULL Power"
Brakes will do more to
boost car sales than any
other feature

they are safer!

Your dealers don't have to tell a car prospect *why* these brakes are safer—they can show them.

For anyone can prove to his own satisfaction that it is easier and quicker to get the foot on the Stewart-Warner low brake pedal than on the high brake pedal used with "Partial Power" brakes which depend upon leg muscle, assisted by booster devices. Make the test yourself.

These Brakes respond instantly, accurately to an easy rocking foot motion like that used on the accelerator. No lunging leg action required.

Braking force is automatically and uniformly distributed to all four wheels—And on curves, the application of brakes on front wheels releases

in proportion to the angle of turning. This is an exclusive Stewart-Warner feature.

Your dealers and their customers will appreciate the fact that Stewart-Warner Automatic "Full Power" Brakes give mileage far beyond ordinary brakes before adjustment is needed, and that when adjustment is required, a few moments' time — with a wrench and a screw driver — does the job completely and accurately.

Investigate the many advantages these brakes offer for factory installation on motor cars, motor coaches and trucks.

Our engineers are at your command. Stewart-Warner Corporation, Brake Division, Chicago, U. S. A., or 6050 Cass Avenue, Detroit.

Stewart-Warner Automatic "FULL POWER" Brakes Will
Do More To Boost Car Sales Than Any Other Feature

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"FULL POWER" BRAKES

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Heavy, medium and light stampings in any quantity. A steady flow of production—when you want it.

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Worcester, Mass.

QUALITY STAMPINGS

DILECTO

DILECTO insulating sheets, rods, tubes and special shapes. Also CELORON Timing Gears and Diamond Vulcanized Fibre.

CONTINENTAL-DIAMOND FIBRE CO.
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Prepares Auto Bodies for Painting

RODINE—
Pickling Bath Control

STRIPPLE—
High Speed Enamel Remover

PEROLINE—
Rust Preventing Oil

KEMICK—
Manifold Paint

FLOSOL—
Soldering Flux

PARADOX—
Rust Proofing Enamel

AMERICAN CHEMICAL PAINT CO.
AMBLER, PENNA.

EF **ELECTRIC AND FUEL FIRED FURNACES**

AND MATERIAL HANDLING EQUIPMENT

LOWER COSTS **THE ELECTRIC FURNACE CO.**
SALEM OHIO

BUYERS' GUIDE

Automotive Products and Factory Equipment Manufactured by Advertisers in This Issue

See Alphabetical List of Advertisers on Page 40

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Axles Park Drop Forge Co.	Bushings <i>Fibre</i> Continental-Diamond Fibre Co.	Cups, Lubricating Gits Bros. Mfg. Co.	Gaskets <i>Felt</i> American Felt Co.	Heat Treating Barnes-Gibson-Raymond, Inc. Barnes Co., Wallace Gibson Co., Wm. D.
Bearings, Anti-Friction <i>Ball, Roller & Thrust</i> S. K. F. Industries, Inc.	Cable, Brake or Cutout Control Amer. Steel & Wire Co. Wickwire Spencer Steel Co.	Drilling Machines Foote-Burt Co.	Gasoline Ethyl Gasoline Corp.	Hoods Motors Metal Corp.
Bending & Straightening Machines Chambersburg Engineering Co. Chambersburg-National Co. National Machinery Co.	Cable, Ignition, Starting & Lighting Amer. Steel & Wire Co.	Enamels American Chemical Paint Co. (Rust Proofing)	Gear Material <i>Non-Metallic</i> Continental-Diamond Fibre Co.	Hose, Flexible Metallic (Radiator & Fuel Lines) Titeflex Metal Hose Co.
Boring Machines Foote-Burt Co.	Carburetors Bendix Aviation Corp.	Felt American Felt Co.	Gears, Timing <i>Non-Metallic</i> Continental-Diamond Fibre Co.	Insulating Material Continental-Diamond Fibre Co.
Brake Testers Bendix Aviation Corp.	Channels for Glass <i>Felt</i> American Felt Co.	Fenders Motors Metal Corp.	Grinding Machines, Universal and Internal Landis Tool Co.	Lathes <i>Automatic Chucking</i> Potter & Johnston Machine Co. <i>Turret</i> Potter & Johnston Machine Co.
Brakes <i>Mechanical</i> Bendix Aviation Corp. Stewart-Warner Corp. <i>Power</i> Bendix Aviation Corp. Stewart-Warner Corp.	Cleaners <i>Metal</i> American Chemical Paint Co. (Rust Preventive)	Forgings Park Drop Forge Co.	Hammers, Power Chambersburg Engineering Co. Chambersburg-National Co. National Machinery Co.	Lubricators, Chassis Gits Bros. Mfg. Co.
Bumpers Stewart-Warner Corp.	Crankshafts Park Drop Forge Co.	Furnaces, Electric (Annealing, Carburizing, Heat Treating, Forging & Welding) Electric Furnace Co.	Hangers, Shafting S. K. F. Industries, Inc.	Molded or Machined Parts (Phenolic) Continental-Diamond Fibre Co.

May 6, 1933

Automotive Industries

CHAMBERSBURG-NATIONAL

COMPLETE FORGING EQUIPMENT

CHAMBERSBURG
ENGINEERING CO.
CHAMBERSBURG, PA.THE NATIONAL
MACHINERY CO.
TIFFIN, OHIOSales Offices
NEW YORK, 152 W. 42nd St. CHICAGO, 565 W. Washington St.
DETROIT, 2457 Woodward Ave.**CRANKSHAFTS**

and

Heavy Drop ForgingsTHE PARK DROP FORGE CO.
CLEVELAND, OHIO**FELT****AMERICAN FELT CO.**

NEW YORK

DETROIT

CHICAGO

FENDERS
DUST SHIELDS
RUNNING
BOARD
SHIELDS
HOODSRUNNING
BOARDS
RADIATOR
SHELLS
BODY
STAMPINGSMOTORS METAL MFG. CO.
5936 Milford Ave. Detroit, Mich.**GITS**King
Pin
Oiler**NEW AUTOMATIC KING
PIN OILER**Oil and Grease Cups
Oil and Grease Seals
Automatic Multiple Oilers
Send for catalogue**GITS BROS. MFG. CO.**

1848-62 South Kilbourne Ave. CHICAGO

Pioneers in Better Drilling MethodsSingle and multiple spindle special drilling, boring, reaming, tapping
machine and FOOTBURT Sipp Sensitive Drilling Machines
THE FOOTE-BURT COMPANY CLEVELAND, OHIO**BUYERS' GUIDE—Continued****Pads****Felt**

American Felt Co.

Panels, InstrumentAmerican Chemical
Paint Co. (Heat
Resisting)**Pickling Compounds**American Chemical
Paint Co.**Presses**Chambersburg Engi-
neering Co.
Chambersburg-National
Co.
National Machinery Co.**Radiator Shells**

Motors Metal Corp.

**Removers, Enamel &
Paint**American Chemical
Paint Co.**Rivets**

Progressive Mfg. Co.

Running Boards, Metal
Motors Metal Corp.**Rust Removers &
Preventives**American Chemical
Paint Co.**Screw Machine Products**Barnes Co., Wallace
Progressive Mfg. Co.**Screw Machines**Potter & Johnston Ma-
chine Co.**Screws**Machine
Progressive Mfg. Co.**Shock Absorbers**

Stewart-Warner Corp.

**Speedometers & Tachom-
eters**

Stewart-Warner Corp.

SpringsExtension, Compression,
Torsion or FlatAmer. Steel & Wire Co.
Barnes-Gibson-Ray-
mond, Inc.Barnes Co., Wallace
Cook Spring Co.
Gibson Co., Wm. D.
Raymond Mfg. Co.
Wickwire Spencer Steel
Co.**Valve**

Amer. Steel & Wire Co.

**Stampings or Drawings,
Metal**Barnes-Gibson-Ray-
mond, Inc.
Barnes Co., Wallace
Cook Spring Co.
Gibson Co., Wm. D.
Motors Metal Corp.
Raymond Mfg. Co.
Wickwire Spencer Steel
Co.
Worcester Stamped
Metal Co.**Starter Drives**

Bendix Aviation Corp.

Steam Cooling

Rushmore Laboratory

Steel**Alloy**Amer. Steel & Wire Co.
Republic Steel Corp.**Bars**

Republic Steel Corp.

CarbonRepublic Steel Corp.
Wickwire Spencer Steel
Co.**Cold Drawn**Amer. Steel & Wire Co.
Republic Steel Corp.
Wickwire Spencer Steel
Co.**Shapes**Wickwire Spencer Steel
Co.**Spring**Barnes-Gibson-Ray-
mond, Inc.
Barnes Co., Wallace
Gibson Co., Wm. D.**Stainless**Amer. Steel & Wire Co.
Co.
Republic Steel Corp.
Wickwire Spencer Steel
Co.**Strip**Amer. Steel & Wire Co.
Republic Steel Corp.
Thomas Steel Co.
Wickwire Spencer Steel
Co.**Tapping Machines**

Foote-Burt Co.

TubingFlexible Metal
Titeflex Metal Hose Co.**Turret Machines,
Automatic**Potter & Johnston Ma-
chine Co.**Vacuum Tanks**

Stewart-Warner Corp.

Washers**Felt**

American Felt Co.

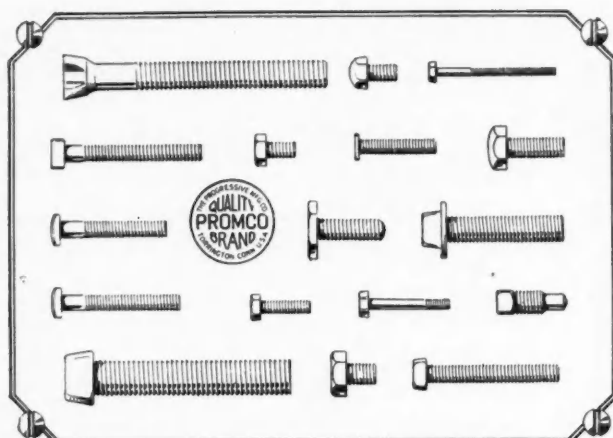
Welding MaterialAmer. Steel & Wire Co.
(Wires & Electrodes)
Wickwire Spencer Steel
Co. (Wires)**Wicks****Felt**

American Felt Co.

Windshield Wipers

Stewart-Warner Corp.

WireFlat, Round, Square or
Special ShapeAmer. Steel & Wire Co.
Barnes Co., Wallace**Spring**Amer. Steel & Wire Co.
Barnes Co., Wallace
Republic Steel Corp.
Wickwire Spencer Steel
Co.



MACHINE SCREWS MACHINE SCREW NUTS

In Stock at All Times

Our products are made on both a quality and price basis. Their uniformity insures you against slowing down in your assembly operations.

We make a great variety of special screws to order, and our specialists will be glad to consult with you without obligation.

Their advice may prove of mutual advantage. Get in touch with us.

The PROGRESSIVE MFG. CO.
TORRINGTON, CONN., U. S. A.

The illustration indicates a few of the many special parts that we have developed for other manufacturers

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THE PIONEER MANUFACTURER OF AUTOMATIC CHUCKING EQUIPMENT
POTTER & JOHNSTON MACH. CO.
PAWTUCKET, R. I., U. S. A.

Steam Cooling

**SOLVES THE PROBLEM
OF INCREASING
RADIATOR CAPACITIES**

Rushmore Laboratory

PLAINFIELD • NEW JERSEY

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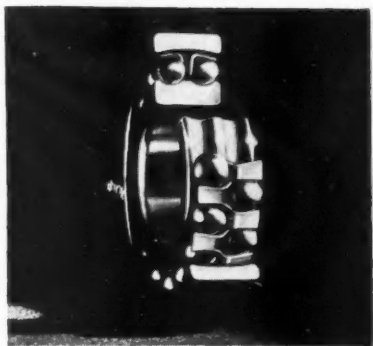
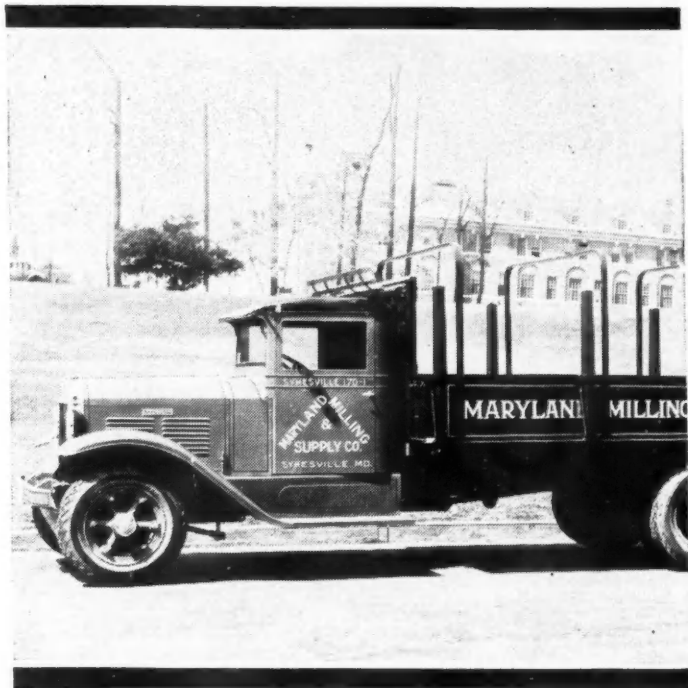
W

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THE SKF GALLERY OF DISTINGUISHED PERFORMANCE USERS:

MACCAR CORPORATION

QUALITY OF SKF BEARINGS ASSURES ECONOMY



HERE IS another manufacturer with whom SKF Performance Takes Preference Over Price on a vital bearing location. SKF Self-Aligning Ball Bearings are used in their drive shaft center bearings not only on this truck but a number of other models...to insure that dependability which is only certain without the sacrifice of known, proven quality in the selection of equipment.

SKF Self-Aligning Ball-Bearings are the logical choice for this application. The inherent capacity of rolling self-alignment within the bearing itself assures performance that is free from bearing trouble under the hardest service. There is no wear...no need for bearing adjustments. Properly housed, these bearings require comparatively little attention and return economies that naturally follow where the greatest mileage per bearing dollar is realized.

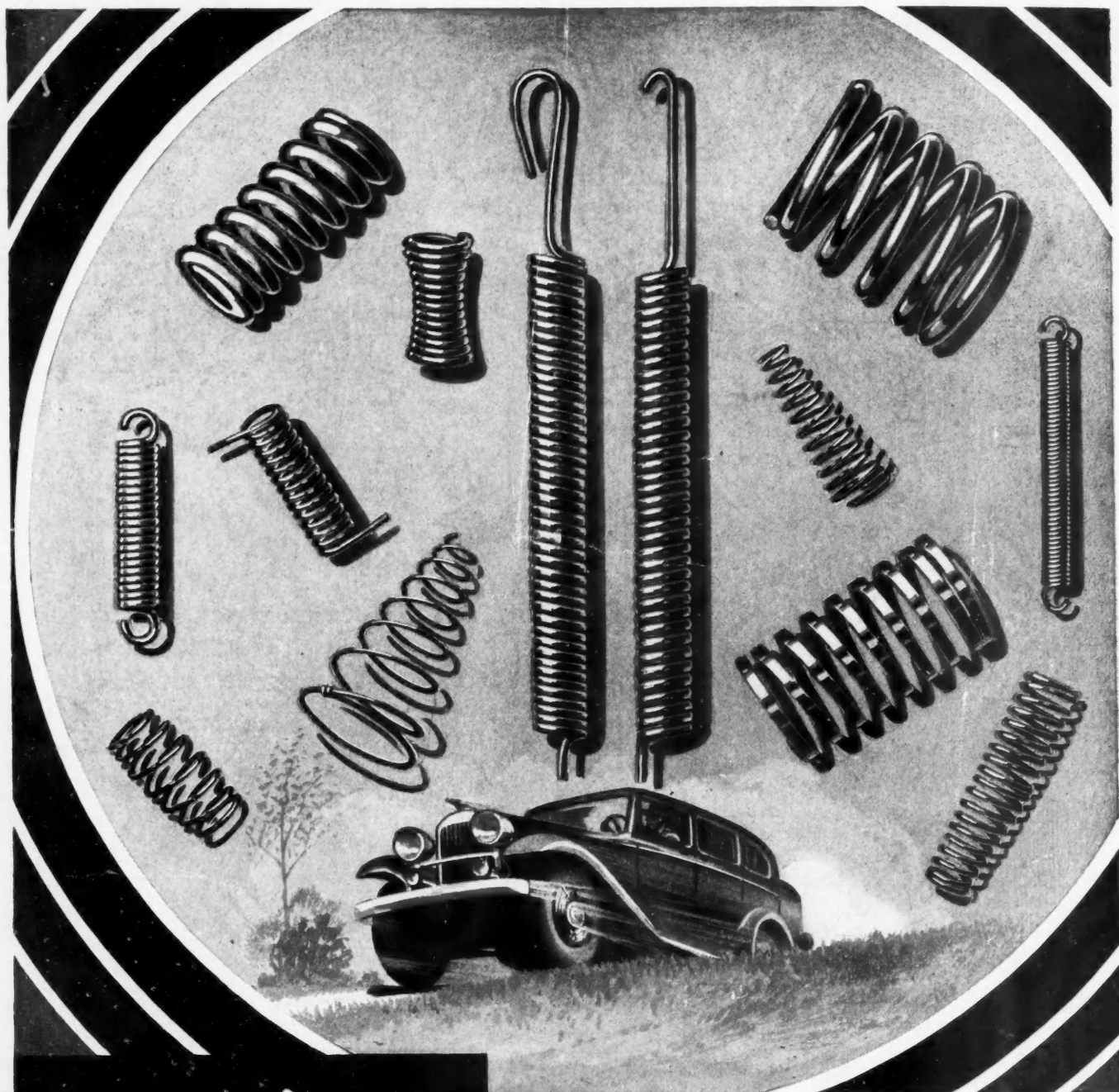
SKF INDUSTRIES, Inc.
40 East 34th Street, New York, N. Y.

3030

WHERE PERFORMANCE TAKES PREFERENCE OVER PRICE

● You may buy a bearing as a bargain but try and get a bargain out of using it, for nothing is apt to cost so much as a bearing that cost so little





American
QUALITY
Steel & Wire Company

SPRINGS

Springs That Guard the Reputation of Your Products

Many reasons have prompted manufacturers to specify American Quality Springs—consistent quality, more than a century of experience, complete engineering service and economy. But above all is the fact that the unfailing performance of these springs guarantees customer satisfaction and guards the reputation of your products. We will gladly work with you in providing a satisfactory and economical solution to your own spring problems.

1831



1933

AMERICAN STEEL & WIRE COMPANY

208 South La Salle Street, Chicago

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

And All Principal Cities

Pacific Coast Distributors: Columbia Steel Company, Russ Building, San Francisco

Export Distributors: United States Steel Products Company, New York

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

General business activity continued to advance last week. The improvement included most lines of trade; and, while it was not accompanied by the rampant speculation of the preceding week, the gains were substantial and more than seasonal. A more cautious attitude on the part of traders and investors had the effect of lowering the prices of speculative commodities. The dollar in foreign exchange markets was steadier.

Freight Loadings Low

Railway freight loadings during the week ended April 22 totaled 492,970 cars, which marks a decrease of 1,245 cars below those during the preceding week, a decrease of 69,557 cars below those a year ago and a decrease of 265,533 cars below those two years ago.

Employment Drops

The index of employment in manufacturing industries, compiled by the Department of Labor, for March stood at 55.1, as against 57.5 for February and 64.5 a year ago. The index of payrolls stood at 33.4, as against 36.4 for February and 48.2 a year ago.

Power Production

Production of electricity by the electric light and power industry in the United States during the week ended April 22 was 2.6 per cent below that a year ago. This marks the smallest decrease since September, 1931.

Crude Oil Output

Average daily crude oil production in the United States for the week ended April 22 amounted to 1,795,500 barrels, as against 1,934,000 barrels for the preceding week and 2,267,900 barrels for a year ago.

Bituminous Coal Steady

Production of bituminous coal during the week ended April 15 totaled 4,850,000 tons, as against 4,755,000 tons during the preceding week and 4,950,000 tons a year ago. Anthracite production amounted to 717,000 tons, as against 874,000 tons during the preceding week and 1,322,000 tons a year ago.

Fisher's Index

Professor Fisher's index of wholesale commodity prices for the week ended April 29 stood at 58.6, the highest since the week ended December 17, 1932, as against 57.1 the week before and 56.8 two weeks before.

Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended April 26 showed decreases of \$29,000,000 in holdings of discounted bills and of \$31,000,000 in holdings of bills bought in the open market. Holdings of Government securities remained unchanged. The reserve ratio on April 26 was 62.7 per cent, as against 61.5 per cent a week earlier and 60.6 per cent two weeks earlier.

Receivers Appointed for Marmon Company

Reorganization Plans Under Way—Marmon-Herrington Co. Not Affected by Receivership

INDIANAPOLIS — Receivers were named on Monday of this week for the Marmon Motor Car Co. in superior court here. The suit asking a receiver was filed by the Eaton Spring and Axle Company on an account of \$1,100. Ferd Barnickel, president of the Indianapolis Drop Forging Company, and Robert A. Adams, attorney, were named receivers for the Marmon Company. Walter C. Marmon, chairman of the board for the Marmon-Herrington Company, Inc., truck manufacturers, explained that this action does not affect the truck firm in any way as the two firms have been completely independent for more than a year.

The appointment of the Marmon receiver follows several months of reorganization seeking to conserve the assets of the company. G. M. Williams, president of the Marmon Motor Car Co., said that the national bank holiday caught the company at a critical time and that production could not be brought to profitably high levels. Williams added that work already has started to attempt a plan whereby the business may be kept alive after the release from receivership.

Auditors have been at work on Marmon books for some time and as yet no report has been made.

Gasoline Consumption Declines 5.4 Per Cent

NEW YORK — Gasoline consumption in the first two months of 1933 amounted to 2,001,855,000 gal. as compared with 2,150,934,000 gal. in the same months last year, a decrease of 5.4 per cent. In February, consumption totaled 953,422,000 gal. against 1,054,267,000 in February, 1932.

Increases were shown over the first two months of 1932 only in the District of Columbia, Iowa, Kansas, Maine, Nebraska, North Dakota and Oregon. In none of these political divisions does the gasoline tax exceed four cents per gal.

G.M. Continues 25c Common Dividends

NEW YORK — General Motors has declared on the outstanding common stock a quarterly dividend of 25c. a share, payable June 12, 1933, to stockholders of record May 11, 1933. In addition the regular quarterly dividend of \$1.25 a share was declared on the \$5 Preferred Stock, payable August 1, 1933, to stockholders of record July 10, 1933.

M.E.W.A. Backs M.E.M.A. Show

CHICAGO, April 25.—The Motor and Equipment Wholesalers Association will give this year's national automotive exposition of the Motor and Equipment Manufacturers Association "its complete support and cooperation in every way possible in providing for the industry a trade exhibition that will do justice to the interests of the entire trade."

Announcement to that effect is contained in a communication to M.E.W.A. members sent out over the signature of B. W. Ruark, General Manager.

"This association and the M.E.M.A., together with its predecessor, have consistently stood for one representative trade show for our industry. That is still the position of the M.E.W.A." Mr. Ruark states.

This year's exposition is scheduled to be held here at the Merchandise Mart from October 23rd to 28th.

Packard Exports Gain

DETROIT—D. C. Budd, general manager of the export division of Packard Motor Car Co., has reported that export business for the first quarter this year exceeded that of the first quarter last year by 26 per cent.

April White Volume Up 50% from March

CLEVELAND—An order for 22 White heavy-duty trucks, valued at approximately \$100,000 for the chassis above, from the Kroger Grocery & Baking Company, of Cincinnati, has been received by the White Motor Co. These units will be equipped with a drop-frame trailer of special design.

In addition to this large order the White Company also received an order for five Indiana and five Studebaker trucks from the Fidelio Brewing Company, of New York City, one of the oldest brewing establishments in the country. In the past few weeks the company has received orders for more than 65 trucks for the hauling of beer.

"We are encouraged with the apparent betterment in general business conditions," President Bean said. "White district and branch offices showed a 22 per cent gain during the

first quarter of this year as compared with 1932, and our April business is 50 per cent better than in March."

Eaton First Quarter Loss

CLEVELAND.—Eaton Mfg. Co., including subsidiaries as well as the Wilcox-Rich Corp., reports net loss for the first three months of 1933 of \$207,429 against a profit of \$57,723 in the corresponding quarter a year ago. The loss reported is after depreciation, taxes, etc., but before Wilcox-Rich class A dividends.

Prosser Takes on Krause

NEW YORK.—Thomas Prosser & Son, American distributors of Widia brand cemented carbide tools, announce that they have taken on the distribution of the Krause precision boring machine which was described in *Automotive Industries*, April 15.

Hinchcliffe New Graham Distributor in Boston

BOSTON—The Hinchcliffe Motor Co. has been appointed Graham Paige distributor for eastern Massachusetts and Connecticut. F. A. Hinchcliffe, its president, is one of the pioneers in New England starting with Winton 30 years ago. He is secretary-treasurer of the Boston Automobile Dealers Association. The company was New England distributor for Auburn several years. Graham Paige has been operated as branch in Boston for a decade.

Delco Products Expands Output

DAYTON—Delco Products Corp. has increased production to 80 per cent of capacity compared with 50 per cent a month ago. The number of employees has been increased to 3000 against 2400 a month ago and 3500 a year ago.

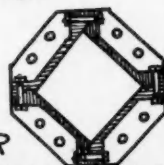
Automotive Oddities—By Pete Keenan

Write us if you
know an Oddity



THOMAS HILL

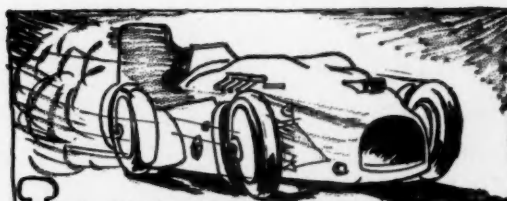
THE OLDEST DRIVER IN THE WORLD
103 YEARS OLD. ALWAYS DRIVES IN
SECOND GEAR AND NEVER EXCEEDS 12 MILES
AN HOUR. Mancelona, Mich



INVENTOR
DESIGNS METHOD OF BUILDING
ENGINES WITH SQUARE SHAPED
CYLINDERS AND PISTONS.
CLAIMS IMPROVED PERFORMANCE
AND SIMPLER CONSTRUCTION.



TURPENTINE
AND RUBBER
ARE MADE OF
THE SAME
ELEMENTS
IN THE SAME
PROPORTION.



THE BLUE BIRD USED A
GALLON OF GAS EVERY QUARTER
OF A MILE ON ITS RECORD RUN.

Daytona
Beach
1933.



FOKKER

DESIGNER OF GERMAN PLANES
IS NOT A GERMAN. He was
born in Java.

Studebaker Shipments Pass 250 Daily Mark

Five Days Ending April 25 Best Since June, 1932

SOUTH BEND—With the exception of the period early in the year when new models were distributed to dealers, the number of cars shipped by Studebaker during the five day period ending April 25 was higher than in any other five day shipping period since June 20, 1932, Paul G. Hoffman, president of The Studebaker Sales Corporation of America, reported today.

Shipments during this April period exceeded thirteen hundred cars and were 15.2 per cent greater than those of the next greatest five day shipping period, Mr. Hoffman said.

He also announced that, since March 21, scores of representative distributors and dealers in all sections of the country have been signing Studebaker and Rockne franchises. Among others, the following new retail outlets have been established in strategic markets: Arthur R. Lindburg Co., San Francisco, Cal.; Pasquini Motor Co., Wilkes-Barre, Pa.; Adt. Motor Company, Kansas City, Kansas; Piedmont Motor Corp., Winston-Salem, N. C.; Robt. Y. Burns, Erie, Pa.; Phil Payne Motor Co., Lynchburg, Va.; Graulich Auto Sales Co., Evansville, Ind.; Wilcox & Malm, Grand Forks, N. D.; Meridian Garage, Yankton, S. D.; J. S. Terman, Mansfield, Ohio; John R. Mattson, Inc., Brookline, Mass., and Slater Motor Sales Inc., Greenwich, Conn.

Milwaukee Pump and Tank Works Formed

MILWAUKEE—Milwaukee Pump & Tank Works, Inc., has been organized by Charles D. Ashley and associates to take over the assets and continue the business of the Milwaukee Tank Works, Inc., manufacturer of tanks, pumps and other filling station and garage equipment, in receivership. The property was bought at trustee's sale for \$121,000, the amount of two mortgages.

New Two-Stroke Engine

WASHINGTON, D. C.—A new two-stroke aircraft engine is reported to have passed its tests in England and may appear on the market shortly. It is said to be a four-cylinder in-line engine and to develop 180 hp. at 4500 r.p.m., for a weight of only 185 lb. A 3-to-1 gear reduction is used. The uniflow principle is employed, air and combustible mixture entering the cylinders at the top and the burnt gases being discharged at the bottom. There are two valves admitting pure air from a compressor to the cylinder at the top, producing a supercharging effect.

These are actuated by a half-time shaft and operate alternately. In addition there is a valve through which an over-rich mixture is admitted, this valve opening at about the time the exhaust ports at the bottom end of the cylinders close. It is claimed that by admitting an over-rich mixture and a charge of air separately, a very high compression ratio can be used.

Ikert with Weidenhoff

CHICAGO—B. M. Ikert has joined Joseph Weidenhoff, Inc., as technical editor and will devote his efforts to trade and other educational activities. Mr. Ikert was at one time technical editor of *Motor Age*, now merged with *AUTOMOBILE TRADE JOURNAL*, and most recently was managing editor of *Motor Maintenance*, which has been discontinued.

Bendix Reports Loss

CHICAGO—Bendix Aviation sustained a net loss of \$267,463 in the first quarter of 1933 contrasted with a net profit of \$26,364 in the same quarter last year.

Hill With Hexcel

The Hexcel Radiator Company announces that V. O. Hill has been appointed general sales manager.

CALENDAR OF COMING EVENTS

CONVENTIONS

National Association of Cost Accountants Convention, Waldorf-Astoria Hotel, New York.....June 12-15

MEETINGS

Natl. Automobile Chamber of Commerce, Annual, New York City, June 8
Natl. Retail Hardware Assoc., Indianapolis.....June 12-16
A.S.M.E. Natl. Aeronautic Meeting, Chicago.....June 26-27
American Society for Testing Materials, Chicago.....June 26-30
Automotive Engine Rebuilders Assoc., Annual, Chicago.....July 10-14
International Automotive Engineering Congress of the S.A.E., Chicago, Aug. 28-Sept. 4
American Chemical Society, Chicago, Sept. 11-15
American Transit Assoc., Chicago, Sept. 18-20
Natl. Safety Council, Chicago.....Oct. 2-6
National Metal Congress, Detroit, Oct. 2-6
American Petroleum Institute, Annual, Chicago.....Oct. 24-26

SECTION MEETINGS—S. A. E.

Baltimore.....May 18
Canadian.....May 17
Cleveland.....May 18
Metropolitan.....May 18
New England.....May 10
Northern California.....May 9
Philadelphia.....May 10
Pittsburgh.....May 11
Southern California.....May 19
Washington.....May 17

RACES

Indianapolis Race.....May 30

British Parts to Get Free Canadian Entry

Dominion Adopts Amendment Lifting 20 Per Cent Tariff

TORONTO—Duty-free entry of "parts of motor cars and motorcycles" manufactured in the United Kingdom, is provided by the adoption of an amendment to the Customs tariff by the Canadian Parliament. In one sweep, entirely to the advantage of the allied industries in Great Britain, this means a reduction of 20 per cent in the cost of motor car and motorcycle parts to the consumer in the Dominion. Just what will be listed as free of duty as a result of this comprehensive change has not yet been officially divulged.

The intention of the unexpected amendment is to encourage the assembly of British motor vehicles in Canada, either in factories already established or in assembly plants to be created. There has been some talk of cooperative warehouses in the Dominion for British motor vehicle manufacturers and if there was ever a legislative provision to encourage this development this is it. A manufacturer or distributor can now import parts from Britain entirely free of duty and proceed with the assembly of the complete unit in Canada.

The development also means much to the motorcycle trade in Canada. During this season practically two-thirds of all motorcycles sold in Canada will be of British manufacture. Incidentally, less than five years ago, the situation was entirely reversed with approximately two-thirds of all sales being of motorcycles imported from the United States.

Nagler With Allis-Chalmers

MILWAUKEE—Forrest Nagler, mechanical engineer, formerly a staff executive of the A. O. Smith Corp., has become associated with the Allis-Chalmers Mfg. Co., also of Milwaukee, as representative with headquarters at Toronto, Ont.

Brady in Turin

DETROIT—Lloyd D. Brady, formerly in charge of Ford Motor foundries, River Rouge, has been commissioned by F-I-A-T, Turin, Italy, where Mr. Brady now is, to inject American methods and devices into their already very modern foundry departments.

Packard Appoints Bellows

DETROIT—W. R. Bellows, formerly manager of the Brooklyn branch of the Packard Motor Car Co. of New York, has been appointed general manager of the Packard Motor Car Co. of Chicago, succeeding K. C. Wetstone, resigned.